



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
MAIN CAMPUS
UNIVERSITY EXAMINATIONS (MAIN PAPER)
2023/2024 ACADEMIC YEAR**

FOURTH YEAR TRIMESTER EXAMINATIONS

**FOR THE BACHELOR
OF
MEDICAL BIOTECHNOLOGY**

COURSE CODE: BMB 416:

**COURSE TITLE: MOLECULAR VIROLOGY AND
PATHOGENESIS**

MAIN EXAM

DATE: 8TH DECEMBER 2023

TIME: 8.00-10.00AM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A B and C, carrying respectively: Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (20 Marks)

1. How is hepatitis B primarily transmitted?
 - A. Through respiratory droplets
 - B. By consuming contaminated food or water
 - C. Parenterally, sexually, or from mother to baby
 - D. Through casual contact with infected individuals
2. What is the natural reservoir of the MERS coronavirus?
 - A. Bats
 - B. Dromedary camels
 - C. Rodents
 - D. Birds
3. Who is credited with introducing the term "virus" and initially suggesting that viruses were contagious, soluble living germs?
 - A. Martinus Beijerinck
 - B. Friedrich Loeffler
 - C. Wendell Meredith Stanley
 - D. Carlos Finlay
4. What is one of the key advantages of nucleic acid amplification techniques like PCR in clinical diagnostics?
 - A. They use antibodies for virus detection
 - B. They rely on protein amplification
 - C. They can measure the viral load in a patient's sample
 - D. They do not require temperature cycling
5. In 1881 _____ discovered yellow fever virus which is transmitted by mosquitoes?
 - A. Martinus Beijerinck
 - B. Friedrich Loeffler
 - C. Carlos Finlay
 - D. Walter Reed
6. Which of the following is not one of the pathogenic mechanisms of viral disease?
 - A. Implantation of virus at the portal of entry
 - B. Local replication
 - C. Spread to target organs
 - D. Activation of the host immune system
7. Which factor affects the accessibility of a virus to tissue during pathogenesis?
 - A. Virus shedding into the environment
 - B. Cell susceptibility to virus multiplication
 - C. Local replication of the virus
 - D. Host immune defenses
8. What does natural selection favor in the context of viral strains?
 - A. High virulence
 - B. Rapid mutation rates
 - C. Low virulence
 - D. Large-scale outbreaks

9. The following is true regarding viral mRNA translation compared to host cell mRNA translation?
- A. Viral mRNAs are always polycistronic.
 - B. Viral mRNAs are never polyadenylated.
 - C. Viral mRNAs are usually monocistronic, similar to host cell mRNAs.
 - D. Viral mRNAs lack a 5' cap.
10. Which enzyme is typically used in the PCR to amplify DNA strands?
- A. DNA Polymerase
 - B. RNA Polymerase
 - C. Reverse Transcriptase
 - D. DNA Ligase
11. To amplify RNA in a nucleic acid detection method, such as PCR, which enzyme is used to convert RNA into complementary DNA?
- A. RNA Polymerase
 - B. DNA Ligase
 - C. Reverse Transcriptase
 - D. DNA Polymerase
12. Who disproved the theory that viruses were liquid in nature but particles?
- A. Friedrich Loeffler
 - B. Wendell Stanley
 - C. Paul Frosch
 - D. Walter Reed
13. What is the primary mode of transmission for enteroviruses?
- A. Respiratory droplets
 - B. Sexual contact
 - C. Oral-fecal route
 - D. Bloodborne transmission
14. Which viral species is mainly responsible for causing the common cold and exacerbations of asthma and chronic bronchitis?
- A. Rhinovirus
 - B. Enterovirus
 - C. Parechovirus
 - D. Coxsackie virus
15. Which is the primary mode of transmission for Middle East respiratory syndrome (MERS) coronavirus?
- A. Respiratory droplets
 - B. Oral-fecal transmission
 - C. Sexual contact
 - D. Bloodborne transmission
16. Smallpox disease was officially declared eradicated in which year?
- A. 1977
 - B. 1980
 - C. 1990
 - D. 2000

17. Which virus is most important cause of bronchiolitis and the leading cause of respiratory tract infections in children?
- Parainfluenza virus
 - Human metapneumovirus
 - Rubeola virus
 - Respiratory Syncytial Virus
18. The primary mechanism of epidemics of influenza, caused by influenza A and B viruses is?
- Antigenic shift
 - Antigenic drift
 - Mutations in the M gene
 - Respiratory droplet transmission
19. When were highly pathogenic H5N1 viruses first detected in birds, leading to transmission to humans in Hong Kong?
- 2003
 - 1996
 - 2007
 - 2010
20. What is a common feature of viral mRNAs in terms of their structure?
- They lack a 5' cap
 - They are capped and methylated at their 5' terminus and polyadenylated at their 3' end.
 - They are often polycistronic
 - They are monocistronic

SECTION B: Short Answer Questions (40Marks)

- What are the merits and demerits of Animal inoculation for detection of viruses (8mks)
- Describe the different modes of viral transmission (8mks)
- Highlight the regulation process of viral gene expressions in a host cell (8mks)
- Describe the Pathogenesis and pathology of poxvirus in a vulnerable host (8mks)
- Describe the transduction process in bacteriophages (8mks)

SECTION C: Long Answer Questions (60Marks)

- Discuss the factors that influence the pathogenic mechanisms of viral diseases (20mks)
- Explain the principle and technique of PCR used for detection viruses, and list merits and demerits of this method compared to traditional approaches. (20mks)
- Discuss the various types of vaccines used to prevent or treat viral diseases. (20mks)



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UNIVERSITY EXAMINATIONS (MAIN PAPER)
2023/2024 ACADEMIC YEAR**

**THIRD YEAR FIRST SEMESTER EXAMINATIONS
FOR THE DIPLOMA
IN
MEDICAL BIOTECHNOLOGY**

COURSE CODE: BBD 315

**COURSE TITLE: PRINCIPLES OF PHARMACOLOGY AND
TOXICOLOGY**

DATE: 8TH DECEMBER 2023

TIME: 8.00-10.00AM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A B and C, carrying respectively: Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

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SECTION A: Multiple Choice Questions (20Marks)

1. Which one of the following is a phase one reaction?
 - A. Reduction.
 - B. Acetylation.
 - C. Glucuronidation.
 - D. Methylation.
2. With regard to a drug _____
 - A. LD50 is 50% of the dose necessary to kill experimental animals
 - B. Efficacy is the maximum response produced by a drug
 - C. Spare receptors are present if Kc50 is the same as EC50
 - D. Potency is the same as affinity
3. Regarding biotransformation-----
 - A. Phase one reactions always precede phase two reactions
 - B. Skin is an organ involved in drug biotransformation
 - C. Water conjugation is a phase one reaction
 - D. CYP2D6 accounts for the majority of P450 activity
4. Which of the following receptor - ligand pathway is correct?
 - A. Insulin - G protein receptor
 - B. Mineralocorticoid - tyrosine kinase receptor
 - C. Vitamin D - intracellular receptor
 - D. Adrenaline - ligand gated channel receptor
5. The metabolic pathway of detoxification that become increasingly important in paracetamol toxicity is _____
 - A. Conjugation with glucuronide
 - B. Reduction
 - C. Methylation
 - D. Cytochrome p450 dependent glutathione conjugation
6. which one of the following drugs does not enhance other drug metabolism?
 - A. Rifampicin
 - B. Ketoconazole
 - C. Phenobarbital
 - D. Griseofulvin
7. Regarding pharmacology principles _____
 - A. Diffusion is directly proportional to thickness and inversely proportional to surfacearea
 - B. LD50 - 50% of the dose that kills most people
 - C. Efficacy is the maximum response produced by a drug
 - D. A partial agonist is always less potent than a full agonist
8. 2mL of 0.5% wv is equal to _____
 - A. 1mg
 - B. 10mg
 - C. 100mg
 - D. 20mg
9. What is an example of a phase II biotransformation?
 - A. Oxidation
 - B. Reduction

- C. Glycolysis
 - D. None of the above.
10. Regarding enzyme induction
 - A. It is irreversible
 - B. It takes 4 months to develop
 - C. Causes increase in smooth endoplasmic reticulum
 - D. Causes increase in rough endoplasmic reticulum
 11. Clearance is proportional to liver blood flow
 - A. True
 - B. False
 12. Volume of distribution _____
 - A. Is inversely proportional to clearance
 - B. Is used to work out the maintenance dose
 - C. Is high in warfarin
 - D. Is proportional to half life
 13. For a specific effect, drug A is more potent than drug B. It follows that _____
 - A. Drug B is a partial agonist acting at the same receptor as drug A
 - B. Drug A causes a greater maximal effect than drug B
 - C. When present in identical concentrations, drug A causes a greater effect than drug B
 - D. Drug A has a lower ED50 than drug B
 14. Regarding receptors, which one of the following statements is not true?
 - A. They largely determine quantitative relations between dose of a drug and pharmacologic effect
 - B. They are responsible for selectivity of a drug reaction
 - C. Mediate actions of pharmacologic antagonists
 - D. Spare receptors produce effect without the need for a drug
 15. Regarding elimination kinetics, which one of the following statements is incorrect?
 - A. In first-order kinetics, the rate of elimination is directly proportional to drug concentration
 - B. Ethanol displays dose-dependent kinetics
 - C. In zero-order kinetics, the rate of elimination is constant
 - D. Most drugs display first-order kinetics
 16. Which one of the following drug metabolising systems has been shown to differ in populations in genetically pre-determined ways?
 - A. Reductions
 - B. Acetylations of amines
 - C. Methylation
 - D. Glucuronidation
 17. Phase II reactions in metabolic biotransformation include all of the following except _____
 - A. Water conjugation
 - B. Cytochrome P-450 dependent oxidations
 - C. Acetylation
 - D. Methylation
 18. Receptor antagonists-----
 - A. Prevent agonists from binding to antagonists
 - B. Progressively inhibit agonist response to decreasing concentrations of antagonist
 - C. Cannot be negated at high doses of agonists

- D. Inhibit receptors to a degree proportionate to antagonist concentration
19. Regarding second messengers_____
- cAMP has no role in calcium homeostasis
 - cAMP exerts most of its effects by stimulating cAMP-dependent protein kinases
 - inhibition of adenylyl cyclase results in increased cAMP
 - phospholipase C is situated in the cell nucleus
20. Therapeutic index (TI) is_____
- A ratio used to evaluate the safety and usefulness of a drug for indication
 - A ratio used to evaluate the effectiveness of a drug
 - A ratio used to evaluate the bioavailability of a drug
 - A ratio used to evaluate the elimination of a drug

SECTION B: Short Answer Questions (40 Marks)

- Describe types of drug transportation through membranes (8 Marks).
- Describe two main classes of routes of drug administration (2 Marks).
 - state the advantages and disadvantages in oral route of drugs administration (6Marks).
- The aim of pre - clinical development of drug is to satisfy all the requirements before the compound to be ready for testing in humans for the very first time. The work falls into four categories. Describe these categories as applied in Pre - clinical stage (8 Marks).
- Describe the main ways of drug elimination from the body (8 Marks).
- Describe the sources of drugs (8 Marks).

SECTION C: Long Answer Questions (60 Marks).

- Discuss the main aspects covered in the four stages of **clinical trial** in the process of drug development (20 Marks).
- Classify parasympathomimetics giving two examples of each class (6 Marks).
 - Discuss in details the use of drugs in treatment of **Lead poisoning** (14 Marks).
- Discuss the **routes** of drug administration (20 Marks).