



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2018/2019 ACADEMIC YEAR**

**FOURTH YEAR SECOND SEMESTER EXAMINATIONS**

**FOR THE DEGREE  
OF  
BACHELOR OF SCIENCE MEDICAL BIOTECHNOLOGY  
MAIN EXAM**

**COURSE CODE: BMB 422**

**COURSE TITLE: MODERN DRUG DEVELOPMENT AND  
GENE THERAPY**

**DATE: 30<sup>TH</sup> MAY 2019**

**TIME: 8.00 -10.00 AM**

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**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**).

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over.

**BMB 422: MODERN DRUG DEVELOPMENT AND GENE THERAPY (Main Exam)**

**TIME: 2 HOURS**

**SECTION A: MULTIPLE CHOICE QUESTIONS (20marks)**

1. In pharmacodynamics, which of the following most accurately describes an antagonist?
  - a. It has no affinity for the receptor
  - b. It has both affinity and efficacy for the receptor
  - c. It has affinity but no efficacy for the receptor
  - d. It has neither affinity nor efficacy for the receptor
  
2. Which of the following is **TRUE** about cardiac glycosides?
  - a. They have a negative inotropic effect
  - b. They have a positive inotropic effect
  - c. They have a positive chronotropic effect
  - d. They are used in the treatment of hypertension
  
3. In what stage of clinical drug development is a candidate drug evaluated in study populations at multiple centers?
  - a. Phase I
  - b. Phase II
  - c. Phase III
  - d. Phase IV
  
4. What is the pharmacological classification of the drug sirolimus?
  - a. It is an antibiotic
  - b. It is an antiinflammatory agent
  - c. It is an anticancer drug
  - d. It is an immunosuppressant
  
5. Why is benzyl penicillin administered to patients parenterally?
  - a. Because it has an unpleasant taste
  - b. Because it causes gastrointestinal irritation
  - c. Because it is susceptible to degradation by gastric acid
  - d. Because it easily triggers emesis
  
6. Which of the following is **TRUE** about apoptosis in body cells?
  - a. It is cell death resulting from hypoxia- induced injury
  - b. It is cell death resulting from free radical- induced injury
  - c. It is cell death resulting from carcinogen- induced injury
  - d. It is programmed cell death

7. Which of the following antihelminthic drugs is best suited for use in large- scale schistosomiasis eradication programs?
  - a. Albendazole
  - b. Oxamniquine
  - c. Praziquantel
  - d. Oxamniquine
  
8. Why are diazepam suppositories administered to children experiencing convulsions?
  - a. Because the drug has a local effect on rectal lesions
  - b. Because the drug is a laxative
  - c. Because the drug is rapidly and efficiently absorbed following intrarectal administration
  - d. Because the drug has not been implicated in causation of colorectal cancer
  
9. Which of the following may be used in the treatment of myasthenia gravis?
  - a. Parathion
  - b. Cyclophosphamide
  - c. Cyclosporin A
  - d. Succinylcholine
  
10. Which of the following antiretrovirals is clinically useful in the prevention of mother-to-child transmission of HIV infection?
  - a. Stavudine
  - b. Saquinavir
  - c. Lamivudine
  - d. Nevirapine
  
11. What key aspect of a candidate drug under development is emphasized in Phase I of a clinical trial?
  - a. Efficacy of the drug in the disease condition of interest
  - b. Safety of the drug when introduced in the human body
  - c. Both safety of the drug and its efficacy in the disease condition of interest
  - d. Adverse reactions caused by the drug in study populations following long- term use
  
12. Which of the following, when administered to a patient, is useful in the treatment of organophosphate poisoning?
  - a. Adrenaline
  - b. Ecothiopate
  - c. Isoprenaline
  - d. Atropine
  
13. Why is glyceryl trinitrate administered sublingually when used in the treatment of angina pectoris?
  - a. Because it has a pleasant taste
  - b. To avoid gastric irritation should it be introduced in the stomach
  - c. Because it is rapidly dissolved in saliva

- d. Because it undergoes rapid and efficient absorption into the blood from the sublingual area.
14. Which of the following may be clinically useful in the treatment of a macrocytic anemia?
- a. Dosage forms of Iron (II) sulphate
  - b. A high protein diet
  - c. Dosage forms of Vitamin B<sub>12</sub>
  - d. A bone marrow transplant
15. Which of the following is **TRUE** about 1, 4- benzodiazepines?
- a. They are used as anxiogenic agents
  - b. They cause skeletal muscle contraction
  - c. They are used as anticonvulsants
  - d. They are used as antipsychotic agents
16. Why is repeat treatment difficult when an adenovirus is used as a transgene delivery vector in gene therapy?
- a. Because of loss of therapeutic efficacy by the transgene
  - b. Because of loss of selectivity by the transgene
  - c. Because of host production of neutralizing antibodies against the viral vector
  - d. Because the adenovirus becomes virulent
17. By which of the following reactions of drug metabolism is isoniazid metabolized?
- a. Sulphation
  - b. Oxidation
  - c. Glucuronidation
  - d. Acetylation
18. Which of the following is **TRUE** about epoxides?
- a. They are products of Phase II reactions of drug metabolism
  - b. They can be metabolized through glucuronidation
  - c. They can be neutralized through reaction with glutathione
  - d. They are products of hepatic hydrolytic reactions
19. In the experimental use of retroviruses as transgene delivery vectors, which enzyme is responsible for the insertion of viral DNA into the host cell genome?
- a. Reverse transcriptase
  - b. Protease
  - c. DNA polymerase
  - d. Integrase
20. Which of the following disease conditions is treated using oral hypoglycemic agents?
- a. Diabetes insipidus
  - b. Congestive cardiac failure
  - c. Diabetes mellitus
  - d. Pulmonary edema

**SECTION B: SHORT ESSAY QUESTIONS.** (40 marks) Attempt ALL the Questions in This Section.

1. Briefly discuss the challenges associated with use of the following transgene delivery vectors in gene therapy. (10 marks)
2. Explain the advantages of use of the intravenous route of drug administration. (10 marks)
3. Briefly discuss the following during the preclinical stage of drug development:
  - a. Pharmacological testing (5 marks)
  - b. Preliminary toxicological testing (5 marks)
4. Write short notes on use of the following classes of drugs in the treatment of HIV infection:
  - a. Reverse transcriptase inhibitors (6 marks)
  - b. Protease inhibitors (4 marks)

**SECTION C: LONG ESSAY QUESTIONS** (40 marks). Attempt Both Questions.

- 1a. Classify parasympathomimetics giving at least **TWO** examples of each class. (7 marks)
- b. Discuss in detail the use of drugs in the treatment of myasthenia gravis. (13 marks)
2. Explain the main aspects covered in the four stages of a clinical trial in the process of drug development. (20 marks)