



*(University of Choice)*

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

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2019/2020 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER EXAMINATIONS**

**FOR THE DEGREE  
OF  
BACHELOR OF SCIENCE MEDICAL BIOTECHNOLOGY  
SPECIAL/SUPPLEMENTARY EXAM**

**COURSE CODE: BMB 422**

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

**DATE: 21<sup>st</sup> October 2020**

**TIME: 2.00 PM - 4.00 PM**

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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

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

**TIME: 2 HOURS**

**Instructions: Answer All the Questions**

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

1. In what phase of clinical drug development is the candidate drug evaluated for safety and efficacy at multiple study centers?
  - a. Phase I
  - b. Phase II
  - c. Phase III
  - d. Phase IV
2. What is the pharmacological classification of tacrolimus?
  - a. It is an antibiotic
  - b. It is an antiinflammatory agent
  - c. It is an anticancer agent
  - d. It is an immunosuppressant
3. Which one 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 programmed cell death
  - d. It is cell death resulting from carcinogen- induced injury
4. 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 when the drug reaches the stomach
  - c. Because it is rapidly and efficiently absorbed into systemic circulation from this site
  - d. Because it rapidly dissolves in saliva
5. Which of the following antihelminthic drugs is most suitable for use in large – scale schistosomiasis eradication programs?
  - a. Albendazole
  - b. Oxamniquine
  - c. Niclosamide
  - d. Praziquantel
6. Why is it difficult to achieve repeat treatment when the adenovirus is used as a 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
  - d. Because the adenovirus turns virulent towards the host
7. Why are steroids effective in the treatment of bronchial asthma?
  - a. Because they are immunosuppressant drugs
  - b. Because they are antiallergic drugs
  - c. Because they are antiinflammatory drugs

- d. Because they are analgesics
- 8. Which of the following physiological events occurs following activation of the Renin-Angiotensin- Aldosterone system?
  - a. Fluid accumulation in the interstitial spaces
  - b. Proteinuria
  - c. Increased blood glucose levels
  - d. Increased systemic blood pressure
- 9. To which chemical class of antibiotics does ciprofloxacin belong?
  - a. It is a macrolide
  - b. It is an aminoglycoside
  - c. It is a fluoroquinolone
  - d. It is a  $\beta$ - lactam
- 10. In what phase of clinical trials during drug development is the pharmacoeconomic analysis of the drug under development undertaken?
  - a. Phase I
  - b. Phase II
  - c. Phase III
  - d. Phase IV
- 11. Why is Norethisterone enanthate effective as a contraceptive agent?
  - a. Because it inhibits spermatogenesis
  - b. Because it inhibits oogenesis
  - c. Because it prevents ovulation
  - d. Because it prevents fertilization and implantation of the fertilized ovum
- 12. Which one of the following may be useful in the treatment of an anemia in which the red blood cells are microcytic and hypochromic?
  - a. Folic acid supplements
  - b. Vitamin B<sub>12</sub> Injection
  - c. Iron dextran Injection
  - d. Recombinant erythropoietin
- 13. In what type of eye disorders is Sodium Cromoglycate eye drops useful?
  - a. Viral infections
  - b. Glaucoma
  - c. Inflammatory conditions
  - d. Allergic conditions
- 14. Why are diuretics used in the treatment of high blood pressure?
  - a. Because they reduce the rate of contraction of the heart
  - b. Because they reduce the force of contraction of the heart
  - c. Because they reduce the total body fluid volume
  - d. Because they increase the total body fluid volume
- 15. Which one of the following is useful in the treatment of epilepsy?
  - a. Acetazolamide
  - b. Ouabain
  - c. Methotrexate
  - d. Carbamazepine

16. A patient with Type I diabetes mellitus is accidentally injected with an overdose of insulin. Which of the following events is likely to occur?
  - a. He may go into a hyperglycemic coma
  - b. He may go into a hypoglycemic coma
  - c. He may experience glycosuria
  - d. He may experience intense thirst
17. Which of the following drugs has a direct benefit in the treatment of pulmonary edema?
  - a. Amoxicillin
  - b. Atropine
  - c. Suxamethonium
  - d. Frusemide
18. Why is digoxin useful in the treatment of congestive cardiac failure?
  - a. Because it has a positive chronotropic effect
  - b. Because it has a positive inotropic effect
  - c. Because it has a negative chronotropic effect
  - d. Because it increases blood flow through the myocardium
19. Which one of the following antiretrovirals is useful in the prevention of Mother-to- Child transmission of HIV infection?
  - a. Lamivudine
  - b. Stavudine
  - c. Nevirapine
  - d. Saquinavir
20. In the experimental use of retroviruses as transgene delivery vectors, what enzyme is responsible for the insertion of viral DNA into the host cell genome?
  - a. Reverse transcriptase
  - b. Protease
  - c. DNA polymerase
  - d. Integrase

**SECTION B: SHORT ESSAY QUESTIONS (40 marks)**

1. Explain the following in the context of the preclinical stage of drug development:
  - a. Pharmacological testing (5 marks)
  - b. Preliminary toxicological testing (5 marks)
2. Write short notes on the use of the following classes of drugs in the treatment of cardiovascular disorders:
  - a. Cardiac glycosides (5 marks)
  - b. Diuretics (5 marks)
3. Explain the use of the following classes of drugs in the treatment of HIV infection:
  - a. Reverse transcriptase inhibitors (5 marks)

- b. Protease inhibitors (5 marks)
- 4. Briefly discuss the challenges associated with use of the following as delivery vectors in gene therapy:
  - a. Retroviruses (5 marks)
  - b. Adenoviruses (5 marks)

**SECTION C: LONG ESSAY QUESTIONS (60 marks)**

1. Explain the main aspects covered in the four phases of a clinical trial in the process of drug development. (20 marks)
- 2a. Classify sympathomimetics giving at least **ONE** example of each class of these drugs. (4.5 marks)
  - b. Explain the mode of action of indirectly- acting sympathomimetics. (5.5 marks)
  - c. Explain the use of  $\beta_2$ - adrenergic receptor agonists in the treatment of bronchial asthma. (10 marks)
3. Using examples discuss the use of the following in the treatment of eye disorders:
  - a. Antibiotics (6 marks)
  - b. Antiinflammatory drugs (6 marks)
  - c. Antiallergic drugs (8 marks)