



(University of Choice)

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

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

THIRD YEAR SEMESTER ONE EXAMINATIONS

**FOR THE DEGREES OF
BACHELOR OF MEDICAL BIOTECHNOLOGY**

COURSE CODE: BMB 312

COURSE TITLE: MOLECULAR PHYSIOLOGY

DATE:

TIME:

INSTRUCTIONS TO CANDIDATES

This examination paper consists of three sections, **A** (Multiple Choice Questions), **B** (Short Answer Questions), and **C** (Long Answer Questions). Answer all questions in ALL the sections.

MMUST observes ZERO tolerance to examination cheating

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

BMB 321: MOLECULAR PHYSIOLOGY

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

- Q1. Which of the following is not true regarding nitric oxide signaling?
- a) Ca^{2+} /calmodulin target is nitric oxide synthase
 - b) Involves phospholipase C
 - c) cAMP is the second messenger
 - d) Cause smooth muscle relaxation
- Q2. Which of the following is not a feature of the interphase of the cell cycle?
- a) Increased metabolic activity
 - b) Nucleolus may be visible
 - c) A pair of centrioles are present
 - d) Chromosomes are clear
- Q3. Which of the following does not constitute events of meiotic prophase I?
- a) DNA condenses
 - b) Homologous chromosomes pair
 - c) Nuclear envelope appears
 - d) Spindle appears
- Q4. Which of the following is not true about insulin action?
- a) The insulin receptor is a receptor tyrosine kinase
 - b) Alpha subunits of insulin receptor bind insulin
 - c) Insulin stimulates glucose transport via glucose transporter, GLUT4
 - d) Maximal degradation of receptor-insulin complex occurs in the endothelium
- Q5. Which of the following is an oncogenic virus implicated in cervical cancer development?
- a) HPV 16/18
 - b) EBV
 - c) HBV
 - d) CMV
- Q6. Which of the following is not a post-translation protein targeting site
- a) Nucleus
 - b) Mitochondria
 - c) Peroxisomes
 - d) Plasma membrane
- Q7. Which of the following is an anion inside neurons?
- a) Sodium
 - b) Potassium
 - c) Chloride
 - d) Calcium

- Q8. Which one of the following is the main hormone stimulating synthesis of insulin-like growth factor in hepatocytes?
- Growth hormone
 - Insulin
 - Thyroxine
 - Cortisol
- Q9. Which of the following is not a cancer causing hypercalcemia?
- Multiple myeloma
 - Renal cancer
 - Bone metastases
 - Paget's disease
- Q10. Which of the following is not a factor that stimulates calcium absorption?
- Acidic pH
 - Lysine and arginine rich diet
 - Intestinal mucosa integrity
 - Basic pH
- Q11. Which of the following is true about the sodium potassium pump:
- For every 2 K^+ in 3 Na^+ out of the cell
 - For every 3 K^+ in 2 Na^+ out of the cell
 - Coupled to ATP hydrolysis
 - Glucose co-transporter
- Q12. Which one of the following is not a chemical carcinogen?
- Naphthylamine
 - Asbestos
 - Uranium
 - Benzene
- Q13. Which of the following is not true regarding troponins action?
- Troponin C has 1 high-affinity Ca^{2+} -binding site and 3 low-affinity Ca^{2+} -binding sites
 - Binding of Ca^{2+} to low-affinity sites induces a conformational change in the troponin complex that has two effects
 - Troponin I moves away from the actin/tropomyosin filament, thereby permitting the tropomyosin molecule to move
 - troponin T pushes tropomyosin away from the myosinbinding site on the actin and into the actin groove

- Q14. Which of the following is not true about the action potential (AP)?
- AP is triggered by depolarization
 - AP propagates with decrement
 - AP involves reversal of membrane potential
 - AP is followed by refractory period
- Q15. Which of the following is a temporary storage form of iron in mucosal cells?
- Ceruloplasmin
 - Ferritin
 - Hemosiderin
 - Apotransferrin
- Q16. Which of the following is not true regarding the steroid receptor?
- It has an amino-terminal activation domain
 - The DNA-binding domain regulates gene activation
 - The hinge region controls movement of receptor from the nucleus
 - The carboxy-terminal ligand-binding domain specifies binding to co-activators and co-repressors
- Q17. Which of the following transport iron in plasma?
- Ferritin
 - Apo ferritin
 - Transferrin
 - Siderophilin
- Q18. Which of the following genes inhibits apoptosis:
- bcl-2
 - p53
 - Caspase
 - Fas
- Q19. Which one of the following is not a steroid hormone
- Retinoic acid
 - Thyroxine
 - Cortisol
 - Estrogen
- Q20. Extracellular fluid in adults differs from intracellular fluid in that its
- Cells contain half to two-thirds of total body fluids
 - Tonicity is the same
 - Anions are mainly inorganic
 - Sodium:potassium molar ratio is lower

- Q21. In skeletal muscle neuromuscular junctions
- It is the modified muscle membrane adjacent to the nerve terminal
 - Motor nerve terminals have vesicles containing acetylcholine
 - There is a high concentration of acetylcholinesterase
 - Transmission is facilitated by botulinum toxin

SECTION B: SHORT ANSWER QUESTIONS (40 MARKS)

- Outline the phases of the cell cycle (4 marks).
 - Explain the role of cyclins and cyclin-dependent kinases in regulating the cell cycle (4 marks)
- Explain the mechanism of acetylcholine neurotransmission (8 marks).
- Classify the different types of cell surface receptors and second messengers (8 marks).
- Outline the factors affecting iron absorption (8 marks).
- Describe the modes of cell signaling (8 marks).

SECTION C: LONG-ANSWER QUESTIONS (40 MARKS)

- Describe the G protein-coupled receptor signaling mechanisms and physiologic functions (20 marks).
- Discuss vitamin D under the following: (20 marks)
 - Metabolism
 - Regulation of metabolism
 - Genomic functions
 - Non-genomic functions