



**TECHNICAL UNIVERSITY OF MOMBASA**  
**FACULTY OF APPLIED AND HEALTH SCIENCES**

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**DEPARTMENT OF MEDICAL SCIENCES**

**UNIVERSITY EXAMINATION FOR:**

**BMLS 14S**

**AML 4207: IMMUNOLOGY**

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**DATE: Pick Date May 2016**

**Instructions to Candidates**

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **TWO** Section(s). Attempt **ALL** questions.

**Circle the correct answer in section A.**

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Section A

Q1. The collective and coordinated response to the introduction of foreign substances by cells and molecules responsible for immunity is called

- a) Immunity
- b) Response
- c) Immune system
- d) Protection
- e) Immune response

Q2. Which of the following consists of cellular and biochemical defense mechanisms that are in place before infection and are poised to respond rapidly to infections?

- a) Lymphatic system
- b) Immune system
- c) Natural immunity
- d) Inflammatory response
- e) Secondary adaptive immunity

Q3. Which of the following refers to immunity conferred to an individual after vaccination?

- a) Artificial active adaptive immunity

- b) Artificial passive adaptive immunity
- c) Natural active adaptive immunity
- d) Natural passive adaptive immunity
- e) Natural active innate immunity

Q4. Which of the following represents the lymphocyte repertoire of a healthy individual?

- a)  $10^3$  to  $10^5$  different antigenic determinants
- b)  $10^5$  to  $10^7$  different antigenic determinants
- c)  $10^7$  to  $10^9$  different antigenic determinants
- d)  $10^9$  to  $10^{11}$  different antigenic determinants
- e)  $10^{11}$  to  $10^{13}$  different antigenic determinants

Q5. Which of the following is the second phase of adaptive immune response?

- a) Recognition of antigens
- b) Activation of lymphocytes
- c) Elimination of antigens
- d) Homeostasis
- e) Formation of memory

Q6. Which of the following molecules is found on the surface of T cells?

- a) Fc receptor
- b) MHC II
- c) Ig
- d) BCR
- e) MHC I

Q7. Which of the following is a secondary lymphoid organ?

- a) Thymus
- b) Bone marrow
- c) Bursa of fabricious
- d) Peyer's patches
- e) None of the above

Q8. The Thymus is at its relative largest size at which of the following stages of development?

- a) Birth
- b) Puberty
- c) Menopause
- d) Old age
- e) Death

Q9. Which of the following classes of antibodies have four subclasses?

- a) IgA
- b) IgD
- c) IgE
- d) IgG
- e) IgM

Q10. IgA can exist in which of the following forms?

- a) Tetramer

- b) Pentamer
- c) Hexamer
- d) Octamer
- e) Nanomer

Q11. Which of the following is a Latin word that refers to the legal protection from prosecution offered to Roman senators during their tenure?

- a) *Nanos*
- b) *Immunitas*
- c) *Vaccinus*
- d) *Neutrinus*
- e) *Commonus*

Q12. Which of the following is the least common serum Ig in the body?

- a) IgA
- b) IgD
- c) IgE
- d) IgG
- e) IgM

Q13. A portion of an antigen that combines with the products of a specific immune response is called

- a) A hapten
- b) An antigen
- c) An immunogen
- d) An antibody
- e) An epitope

Q14. Which of the following factors related to the immunogen influences the immunogenicity of a substance?

- a) Foreignness
- b) Age
- c) Dose
- d) Route
- e) Adjuvants

Q15. Which of the following pattern recognition receptors can recognize TLR-7 and result in the production of interferons?

- a) TLR-3
- b) TLR-4
- c) TLR-5
- d) TLR-6
- e) TLR-7

Q16. Which of the following is a binding site for the T cell coreceptor CD4 molecule?

- a) Beta 2 region
- b) Beta 2 microglobulin
- c) Alpha 3 region
- d) Alpha 1 region
- e) Beta 1 region

Q17. Which of the following is the C3 convertase of the classical pathway?

- a) C3bBb3b
- b) C3bBb
- c) C4b2b
- d) C4b2b3b
- e) C3b2b3b

Q18. The factor H regulates complement by which of the following mechanisms?

- a) Binds to C4b and displaces C2
- b) Cleaves C3b and C4b
- c) Binds C3b and displace Bb
- d) Dissociates C5 convertase
- e) Dissociates C1r and C1s from C1q

Q19. The ability of one cytokine to act on many different cell types is called

- a) Redundancy
- b) Pleiotropism
- c) Antagonism
- d) Synergism
- e) Anergism

Q20. Which of the following cell types are the principal sources of IL-5?

- a) NK cells
- b) NK T cells
- c) Helper 17 T cells
- d) Helper 2 T cells
- e) Helper 1 T cells

Q21. Selection of repertoire and acquisition of functional competence occurs in which of the following stages of lymphocyte maturation?

- a) Pro-lymphocyte
- b) Pre-lymphocyte
- c) Immature lymphocyte
- d) Mature lymphocyte
- e) Differentiated effector lymphocyte

Q22. The V(D)J recombination occurs in 4 distinct sequential events being

- a) Synapsis, joining, coding and processing, and cleavage
- b) Joining, cleavage, synapsis, and coding and processing
- c) Coding and processing, synapsis, cleavage, and joining
- d) joining, cleavage, coding and processing, and synapsis
- e) synapsis, cleavage, coding end processing, joining

Q23. Which of the following represents the first step in performing ELISA?

- a) Remove unbound antigen
- b) Bind antibody to well of microtiter plate
- c) Add varying amount of antigen
- d) Add labeled antibody specific for non-overlapping epitopes
- e) Determine amount of bound antibody

Q24. In western blotting, samples are first separated by which of the following technique?

- a) Agarose gel electrophoresis
- b) Polyacrylamide gel electrophoresis
- c) Nitrocellulose gel electrophoresis
- d) Affinity chromatography
- e) Capillary chromatography

Q25. Which of the following techniques is not ideal for identifying detailed structures of cells and tissues?

- a) Fluorescent microscopy
- b) Confocal microscopy
- c) Flow cytometry
- d) Electron microscopy
- e) Scanning probe microscopy

Q26. Which of the following can be used to study proliferation of T cells *in vitro* or *in vivo*?

- a) ELISPOT
- b) Toluene Blue
- c) Trypan Blue
- d) CFSE
- e) Silver staining

Q27. Pathogenicity experienced during infection by extracellular bacteria is caused by which of the following principal mechanism?

- a) Cytotoxic T cell activation
- b) B cell production of antibodies
- c) Helper T cell activation of B cells
- d) Induction of inflammation
- e) Activation of natural killer cells

Q28. Adaptive immunity to extracellular bacteria is mediated by the following effector mechanisms except

- a) Neutralization
- b) Opsonization
- c) Phagocytosis
- d) Activation of the classical pathway of complement system
- e) Macrophage activation by T cell derived signals

Q29. Which of the following is an immune evasion mechanism by intracellular bacteria?

- a) Inhibition of complement
- b) Inactivation of complement products
- c) Inactivation of reactive oxygen species
- d) Genetic variation of surface antigens
- e) Antiphagocytic mechanisms

Q30. Which of the following is the principal innate immune mechanism against protozoan infections?

- a) Phagocytosis
- b) Activation of complement
- c) Opsonization
- d) Inflammation
- e) IgE production

Q31.

a) Explain the following (2 marks each)

- i) Antibody
- ii) Spleen
- iii) Autoimmunity
- iv) Inflammation
- v) Alloantigen

b) Draw a well labeled diagram of an antibody molecule (10 marks)

Q32. Illustrate the stages of B cell development (20 marks)