



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

**UNIVERSITY EXAMINATION FOR:**

**BMLS**

AML 4207 : IMMUNOLOGY

END OF SEMESTER EXAMINATION

**SERIES: DECEMBER 2016**

**TIME: 2 HOURS**

**DATE:** Pick Date Dec 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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Paper 1

Section A

Q1. Which of the following is the central feature of the immune system?

- a) Self, non-self recognition
- b) Memory
- c) Specialization
- d) Specificity
- e) Naïvety

Q2. Which of the following are components of the innate immunity?

- a) Plasma cells
- b) IL-2 molecules
- c) IL-7 molecules
- d) C1 molecules
- e) Lectin molecules

Q3. In the phases of adaptive immune system, antigen recognition is immediately followed by which of the following events?

- a) Antigen presentation
- b) Signal transduction
- c) Clonal expansion
- d) Differentiation
- e) Effector responses

Q4. Innate immune responses may result in the following except

- a) Prevent infection
- b) Control infection
- c) Eliminate infection
- d) Stimulate adaptive immunity
- e) Initiate the classical pathway

Q5. Which of the following cytokines stimulate inflammation?

- a) TNF
- b) IFN-gamma
- c) IL-12
- d) IL-15
- e) IL-10

Q6. Which of the following functions are not mediated by T cells?

- a) Direct antigen recognition
- b) Antigen presentation through MHC I
- c) Cell mediated responses
- d) Down regulate activities of other cells
- e) Antigen recognition through MHC II

Q7. In which of the following organs may immature lymphocytes generated during hematopoiesis mature and commit to particular antigenic specificity there?

- a) Appendix
- b) Lymph nodes
- c) Peyer's patches
- d) Spleen
- e) Tonsils

Q8. Which of the following cell types kill a variety of target cells?

- a) Dendritic cells
- b) Macrophages
- c) NK cells
- d) Mast cells
- e) Basophils

Q9. An allotype is determined by which of the following?

- a) Heavy chains
- b) Light chains
- c) Genetic differences
- d) Antigen binding specificity
- e) Number of constant regions

Q10. Which of the following antibody class is the first to be produced in a primary response?

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

Q11. IgA may exist in any of the following forms except

- a) Dimer
- b) Pentamer
- c) Tetramer
- d) Monomer
- e) Trimer

Q12. Which of the following immunoglobulins binds very tightly to Fc receptors on basophils and mast cells thereby making it the least common serum immunoglobulin?

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

Q13. Which of the following represents the number of diversity genes that exist in the germline that contribute to the generation of antibody diversity?

- a) 200
- b) 20
- c) 12
- d) 5
- e) 4

Q14. Polyanions of microbes may be recognized by which of the following pattern recognition receptors?

- a) Complement receptors
- b) Mannose-binding protein receptors
- c) TLR-2
- d) TLR-4
- e) Scavenger receptors

Q15. The human leukocyte antigen genes are located on which of the following chromosomes?

- a) Chromosome 12
- b) Chromosome 2
- c) Chromosome 6
- d) Chromosome 17
- e) Chromosome 20

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 has low signal to noise ratio and therefore 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

## Section B

Q31. With the aid of a diagram, discuss the late steps of complement activation (20 marks)

Q32

- a) i. Draw a well labeled diagram of the antibody molecule (8 marks)  
ii. Describe three ways in which antibody molecules function (6 marks)
- b) Describe three regions of lymph nodes (6 marks)