KENYATTA U NIVERSITY

EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY

**HMM 220: MEDICAL MICROBIOLOGY 1**

**2ND SEMESTER 2022/2023** **TIME: 2HOURS**

**INSTRUCTIONS:**

i. Attempt ALL questions.
ii. Section A (MCQ): Choose the correct answer.
iii. Answer questions in sections B and C in the booklets provided

## SECTION A: MULTIPLE CHOICE QUESTIONS (30 X 1 = 30 MARKS)

1. Central tolerance refers to one of the following processes
   A. Destruction of lymphocytes that are specific for self-antigens
   B. Destruction of lymphocytes that are not specific for self-antigens
   C. Destruction of self antigens that are not specific for lymphocytes
   D. Production of self-antigens that are specific for lymphocytes
2. One of the cell types below does not perform phagocytosis
   A. Basophils
   B. Macrophages
   C. Eosinophils
   D. Neutrophils
3. One of the following statements is not true concerning platelets
   A. They have Toll-like receptors involved in recognition of bacteria
   B. Bacterial binding of platelets leads to their activation and release of anti-microbial peptides
   C. The main platelet receptors that mediate these interactions are TLRs
   D. They are involved in inflammation
4. The first immunoglobulin heavy chain class to be expressed on the surface of a newly produced B-cell is:
   A. IgA
   B. IgM
   C. IgD
   D. IgG
5. One of following statement is true about CD4 molecule
   A. It is essentially an intracellular glycoprotein
   B. It is heterodimeric
   C. It binds processed peptide in its outer groove
   D. Binds to MHC class II on antigen-presenting cells

6. Major histocompatibility complex (MHC) refers to a large group of genes that code for proteins that play an essential role in one of the following
   A. Phagocytosis by neutrophils
   B. Antigen presentation to T lymphocytes
   C. Phagocytosis by macrophages
   D. Antigen presentation to B lymphocytes
7. Macrophage activation to kill intracellular pathogens is primarily mediated by
   A. IL-2
   B. IFN γ
   C. GM-CSF
   D. IL-12
8. One of the following is not a major antigen-presenting cell type
   A. Macrophage
   B. Dendritic cells
   C. NK cell
   D. B cells
9. The presence of IgM in serum indicates
   A. Activation of B cells
   B. A recent exposure has taken place
   C. An allergic reaction is present
   D. Activation of memory cells
10. One of the following statements regarding adaptive immunity is true
   A. Prior exposure to antigens is essential
   B. Prior exposure to antigen is not essential
   C. It is a non-specific defense mechanism
   D. Macrophages are the main cells involved
11. One of the following is not relevant in macroscopic examination of a stool sample
   A. Protozoan parasites
   B. Consistency
   C. Presence of adult worms
   D. Composition
12. A blood sample may be rejected on account of the following except
   A. Inappropriate transport temperature
   B. Excessive delays in transportation
   C. Excess quantity
   D. Inappropriate transport medium
13. Success of a parasite is measured by
   A. Its ability to kill the host
   B. The damage that it causes to host
   C. The time it takes in the host
   D. The ability to adapt and integrate itself to a hosts' environment
14. The host for essential developmental parasite stages is
   A. Aberrant
   B. Definitive
   C. Intermediate
   D. Paratenic

15. Anthroponotic diseases can be transmitted from:
    A. Humans to humans
    B. Animals to humans
    C. Humans to animals
    D. Animals to animals
16. Soil transmitted helminthes can best controlled through proper
    A. Medication
    B. Clinical diagnosis
    C. Human excreta disposal
    D. Use of treated water
17. A parasitic commensal is an organism that
    A. Mutually benefits with the host
    B. Entirely living in the host
    C. Depends on the host but may cause harm in favorable condition
    D. Is free living but turns parasitic in a favorable condition
18. One of the following statements correctly defines retro infection
    A. An infected individual acts as a source for hyperinfection to himself
    B. An individual harboring the parasite is re-infected by the same parasite
    C. An infection caused by a newly hatched larva in the region where the adolescent form of the parasite develops
    D. An establishment of arthropods upon or within a host
19. Rectal swabs may not be used
    A. With small children
    B. With debilitated patients
    C. Where voided stool sample is not feasible
    D. In macroscopic assessment
20. Collection of cerebrospinal fluid requires the following except
    A. Lumbar puncture
    B. Trained personnel
    C. Septic environment
    D. Sterile tubes
21. One of the following statements is not an aim in antimicrobial chemotherapy.The antimicrobial agent should
    A. Have selective toxicity
    B. Be active even in high dilutions
    C. Be broken down and excreted rapidly
    D. Be microbicidal
22. One of the following choices lists the steps of pathogenesis in the correct order
    A. Exposure, invasion, adhesion, infection
    B. Adhesion, exposure, infection, invasion
    C. Exposure, adhesion, invasion, infection
    D. Disease, infection, exposure, invasion
23. One of the following would be a virulence factor of a pathogen
    A. A surface protein allowing the pathogen to bind to host cells
    B. A secondary host the pathogen can infect
    C. A surface protein the host immune system recognizes
    D. Bacterial inclusion bodies

24. One of the following is not an exception to the Koch's postulates
    A. Symptoms and diseases can be caused by any one of several microbes
    B. Microorganisms that cannot be cultured on artificial media
    C. A microorganism can only be cultured from an infected individual
    D. Two or more organisms may work in synergy to cause a disease
25. The iodine used in Gram staining serves as a
    A. Catalyst
    B. Chelator
    C. Secondary dye
    D. Mordant
26. One of the statements regarding gram staining is incorrect
    A. *Mycobacterium tuberculosis* stains blue because of the thick lipid layer
    B. *Streptococcus pyogenes* stains blue because of a thick peptidoglycan layer
    C. *Escherichia coli* stains pink because of a thin peptidoglycan layer
    D. *Mycoplasma pneumoniae* is not visible in the Gram's stain because it has no cell wall
27. One of the following metabolic properties differentiates the pink-colored colonies of *E. coli* from the colorless *Salmonella spp* on MacConkey's agar
    A. Urease production
    B. Hemolytic activity
    C. Lactose fermentation
    D. Hydrogen sulfide production
28. One of the following method is the most common routine culture performed in the microbiology lab for the proper isolation and identification of bacteria and fungi
    A. Streak culture
    B. Swab culture
    C. Pour plate culture
    D. Liquid culture
29. One of the following combinations would most likely contribute to the development of a superinfection
    A. Long-term use of narrow-spectrum antimicrobials
    B. Long-term use of broad-spectrum antimicrobials
    C. Short-term use of narrow-spectrum antimicrobials
    D. Short-term use of broad-spectrum antimicrobials
30. One of the following techniques cannot be used to determine the minimum inhibitory concentration of an antimicrobial drug against a particular microbe
    A. Etest
    B. Microbroth dilution test
    C. Kirby-Bauer disk diffusion test
    D. Macrobroth dilution test

**SECTION B: SHORT ANSWER QUESTIONS (50MARKS)**

1. List the five stages of phagocytosis (5 marks)
2. State the five main effector functions of antibodies (5 marks)
3. Describe the process of T Cell Activation (5 marks)
4. Differentiate between humoral and cell-mediated immunity (5 marks)
5. State any five host factors that influence transmission of parasitic infections (5 marks)

6. With an appropriate parasite example in each case, state five portals of entry for protozoans (5 marks)
7. Outline five likely outcomes of improper parasitological specimen collection (5 marks)
8. With an example in each case, explain the following parasitological concepts (5 marks)
    a) Euryxeneous parasite
    b) Diagnostic stage of a parasite
    c) Biological vector
    d) Biological Incubation

9. Outline five possible modes of transmission of infections (5 marks)
10. State five physiological effects of septic shock characterized by the presence of large amount of bacterial endotoxin in the blood (5 marks)

**LONG ANSWER QUESTION (40 MARKS)**

1. A mass malaria screening program was launched following the deaths of 75 children in a village with a total population of 25,500 individuals. A total of 12,500 individuals were susceptible, 1,120 presented with symptoms while 2,050 tested positive. Determine
    a) Infectivity of *Plasmodium falciparum* (3 marks)
    b) Pathogenicity of *Plasmodium falciparum* (3 marks)
    c) Virulence of *Plasmodium falciparum* (4 marks)
2. Explain with examples, Type I and Type III hypersensitivity reactions (10 marks)

3. a. Describe sterilization and disinfection (4 marks)

    b. Discuss the various methods of sterilization and disinfection (16 marks)