



KENYATTA UNIVERSITY
SUPPLEMENTARY/SPECIAL EXAMINATION 2021/2022
EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY

HMM 220: MEDICAL MICROBIOLOGY 1

AUGUST, 2022

TIME: 2 HOURS

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. Major histocompatibility complex (MHC) refers to a large group of genes that code for proteins that play an essential role in:
 - a. Phagocytosis by neutrophils
 - b. Antigen presentation to T lymphocytes
 - c. Phagocytosis by macrophages
 - d. Antigen presentation to B lymphocytes
2. Central tolerance refers to
 - 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
3. One of the cell types below not perform phagocytosis
 - a. Basophils
 - b. Macrophages
 - c. Eosinophils
 - d. Neutrophils
4. 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

5. 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
6. The 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
7. The Binding of an antigen to an antibody is:
 - a. Is usually unaffected by molecular rigidity.
 - b. Is unaffected by the presence or absence of water molecules.
 - c. Involves covalent bonding.
 - d. Is usually unaffected by pH
8. Macrophage activation to kill intracellular pathogens is primarily mediated by
 - a. IL-2
 - b. IFN γ
 - c. GM-CSF
 - d. IL-12
9. One of the following is not an acute phase protein
 - a. C-reactive protein.
 - b. Serum amyloid P component.
 - c. Chondroitin sulfate.
 - d. Fibrinogen.
10. Edward Jenner vaccinated against smallpox using
 - a. An unrelated virus
 - b. Cowpox virus
 - c. A recombinant protein derived from smallpox
 - d. Killed smallpox virus
11. Parasitism can best be described as a symbiotic association in which:
 - a. One symbiont benefits at the expense of the other
 - b. Both symbionts benefit; usually an obligate relationship
 - c. One symbiont benefits, with no impact on the other
 - d. A parasite causes damage to a host
12. Disease is the result of forces within a dynamic system consisting of the following except:
 - a. Agent of infection
 - b. Host
 - c. Environment
 - d. Medicine

13. One of the following is the cardinal method for prevention of transmission of soil transmitted parasites
 - a. Proper medication
 - b. Proper clinical diagnosis
 - c. Proper human behavior of excreta disposal
 - d. Proper use treated water
14. The 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
15. The parasite that has a broad host range is
 - a. Heteroxenous
 - b. Multixenous
 - c. Euryxenous
 - d. Ambyxenous
16. One of the following is not relevant in macroscopic examination of stool sample
 - a. Protozoan parasites
 - b. Consistency
 - c. Presence of adult worms
 - d. Composition
17. A sample specimen may not be rejected on the basis of:
 - a. Inappropriate transport temperature
 - b. Excessive delay in transportation
 - c. Inappropriate transport medium
 - d. Excess quantity
18. An anthroponotic disease can be transmitted from:
 - a. Humans to humans
 - b. Animals to humans
 - c. Humans to animals
 - d. Animals to animals
19. Biological incubation is the:
 - a. Interval between exposure to a pathogen and the earliest manifestation of infection
 - b. Time elapsing between initial infection with the parasite and demonstration of the parasites or their stages in a parasitological specimen
 - c. Diagnostic phase of an infection
 - d. Developmental stage of a pathogenic organism that can be detected in specimen
20. One of the following sources of infection is the most difficult to control:
 - a. Filth-borne
 - b. Vector-borne
 - c. Water-borne
 - d. Food-borne

21. The reason bacterial cells are more resistant to osmotic shock than eukaryotic cells is that bacterial cells:
- Contain a cell wall composed of cellulose
 - Actively block water molecules from entering the cell
 - Are selectively permeable
 - Contain a cell wall composed of peptidoglycan
22. Bacterial fimbriae present on the outer cell surface are used for:
- cellular activity
 - Sexual reproduction
 - adherence to surfaces
 - Exchange of genetic information.
23. The use of the antibiotics that inhibit or inactivate cellular ribosomes will result directly in the loss of which of the following functions:
- DNA replication
 - Phagocytosis.
 - Protein synthesis
 - Cell division
24. ONE of the following is likely to contain structures composed of N-acetylmuramic acid and N-acetylglucosamine:
- Mycoplasmas
 - Escherichia coli*
 - Protoplasts
 - Amoebas
25. ONE of the following statements concerning the Gram stain is FALSE:
- Escherichia coli* stains pink because it has a thin peptidoglycan layer
 - Streptococcus pyogenes* stains purple because it has a thick peptidoglycan layer
 - Mycoplasma pneumoniae* is not visible in the Gram's stain because it does not have a cell wall
 - Mycobacterium tuberculosis* stains purple because it has a thick lipid layer
26. The coagulase test is used to differentiate:
- Staphylococcus epidermidis* from *Neisseria meningitidis*
 - Staphylococcus aureus* from *Staphylococcus epidermidis*
 - Streptococcus pyogenes* from *Staphylococcus aureus*
 - Streptococcus pyogenes* from *Enterococcus faecalis*
27. ONE of the following concentrations of ethanol is most effective as a disinfectant:
- 100%
 - 70%
 - 50%
 - 30%

28. ONE of the following statements regarding bacterial endotoxins is correct
 - a. All have the same effect regardless of bacterial source
 - b. Are found in both gram positive and gram negative bacterial cell wall
 - c. Are part of the cell wall of gram positive bacteria only
 - d. None of the above statement is correct
29. The acid-fast staining method is useful in the diagnosis of infections caused by:
 - a. *Mycobacterium leprae*
 - b. *Streptococcus pyogenes*
 - c. *Mycoplasma pneumoniae*
 - d. *Corynebacterium diphtheriae*
30. Safety measures in a clinic or laboratory are important in preventing:
 - a. Exposure to contaminated specimens
 - b. Interrogation of a risky patient by the nurse
 - c. Use of available space
 - d. Prolonged treatment of the patient with the appropriate medication

SECTION B: SHORT ANSWER QUESTIONS (10 X 5 = 50 MARKS)

1. State any five antimicrobial peptides in the innate immune system (5mks)
2. List the five stages of phagocytosis (5mks)
3. Explain the differences between T-dependent and T-independent antigens. (5mks)
4. Explain the process of T cell activation. (5mks)
5. State any five host factors that influence transmission of parasitic infections (5mks)
6. With a specific parasite example in each case, outline five ways in which parasites can cause anemia in humans. (5mks)
7. Outline five basis of rejecting a fecal specimen collected for parasitological analysis (5mks)
8. With an example in each case, explain the following parasitological concepts (5mks)
 - a) Diagnostic Stage of a parasite
 - b) Infective Stage of a parasite
 - c) Monoxenous parasite
 - d) Infestation
 - e) Clinical Incubation
9. Citing examples, enumerate five different types organism based on their oxygen requirements (5mks)
10. Giving examples, enumerate five different types of culture media (5mks)

SECTION C: LONG ANSWER QUESTION (2 x 20 = 40 MARKS)

- 1 a) Briefly describe the differences between the three complement pathways (10mks)
- b) In a mass malaria screening program launched following deaths of 45 children in a village in Kenya, a total of 8520 were found susceptible to *falciparum* malaria, of which 2270 tested positive. A total count of 640 individuals presented with clinical signs of malaria. Determine:
 - a) Infectivity of *Plasmodium falciparum* (3mks)
 - b) Pathogenicity of *Plasmodium falciparum* (3mks)
 - c) Virulence of *Plasmodium falciparum* (4mks)
- 2 a) Using the aid of a diagram, describe the bacterial growth curve (10mks)
- b) Enumerate any four types of dry heat used in sterilization of objects (4mks)
- c) State any 2 practical applications of the following chemical disinfectants (6mks)
 - i) Phenolic compounds
 - ii) Iodine
 - iii) Formaldehyde