BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT OF OPTOMETRY

JUN 2023

BACHELOR OF SCIENCE (Hons) DEGREE IN OPTOMETRY

CANDIDATE NUMBER: | | | | | | | | | |

OPTC107 MICROBIOLOGY FOR OPTOMETRY (100 Marks)

TIME 3 HOURS

INSTRUCTIONS:

- This paper contains 2 (two) sections.
- Answer ALL 40 questions in section (1) on this paper and ANY 3 questions in Section two (2) in the Examination Booklet. Set your answers on separate sheets.

SECTION (1) ANSWER ALL QUESTIONS (1 MARK)

1. Which statement is true of bacterial structural components?
   (a) The capsule in enclosed within the cell membrane.
   (b) The nucleoid is the region where the bacterial genome is located.
   (c) The cytoplasm lies inside the cytoskeleton.
   (d) Plasmids are significant in everyday functions.

2. The cell membrane in Gram + bacteria are best described as:
   (a) One that has a thick outer peptidoglycan layer.
   (b) One that has a thin peptidoglycan layer.
   (c) One that has no selective protein units within the cytoplasmic membrane.
   (d) One that has an inner cytoplasmic membrane with lipotechoic acid molecules.

3. Which of the following is not a DNA virus?
   (a) Adenovirus.
   (b) Rhabdoviruses.
   (c) Parvoviruses.
   (d) Poxvirus.

4. Which of the following is not an RNA virus?
   (a) Hepatitis Virus.
   (b) Orthomyxovirus.
   (c) Adenovirus.
   (d) SARS.

5. Which of the following structures contains genes for enzymes and antibiotic resistance?
   (a) Plasmids.
   (b) Pilus.
   (c) Capsule.
   (d) Plasma Membrane.

6. Which of the following is the structure related to microbial attachment to cells?
   (a) Flagellum.
   (b) Plasmid.
   (c) Peptidoglycan.
   (d) Glycocalyx.

7. Which of the following is not a gram-negative bacterium?
   (a) *Clostridium perfringens.*
   (b) *Vibrio cholerae.*
   (c) *Escherichia coli.*
   (d) *Pseudomonas*

8. Which of the following is not true related to endotoxins?
   (a) Endotoxins are secreted from cells.
   (b) They contain lipopolysaccharide and lipoprotein complexes.
   (c) Produced by gram positive microorganisms.
   (d) Can cause fever.

9. Which of the following microorganisms is not an aerobic gram-positive bacterium?
   (a) *enterococci.*
   (b) *streptococci.*
   (c) *staphylococci.*
   (d) *Escherichia coli.*

10. Which statement is true of viruses?
   (a) They can live anywhere and survive independently.
   (b) They can replicate outside host cells.
   (c) They are considered to be cells like any other living organism.
   (d) They can be single stranded or double stranded.

11. Shingles is an infection that is usually caused by which microorganism?
   (a) *Streptococcus pneumoniae.*
   (b) *Streptococcus aureas.*
   (c) *Neisseria gonorrhoeae.*
   (d) *Vericella zoster virus.*

12. Which statement is true of viral ocular infections?
    (a) Most viral ocular infections can be managed using antibiotics.
    (b) Both viral and bacterial ocular infections can cause a red eye.
    (c) Viral infections are not as infectious as bacterial infections.
    (d) Adenovirus infections are less common than those of the herpes simplex virus.

13. Which of the following is not true concerning Staphylococcus aureus?
    (a) S. aureus is related to inflammation.
    (b) S. aureus can cause pneumonia.
    (c) S. aureus causes boils and styes.
    (d) S. aureus does not make coagulase.

14. Which of the following is a true statement of Pseudomonas aeruginosa?
    (a) It is a gram-negative bacterium found in soil, water, damp areas and hospitals.
    (b) It is very rarely found in swimming environment.
    (c) It responds very well to antibiotics.
    (d) It is the least cause of bacterial keratitis in contact lens wearers.

15. Which statement is not true of bacterial ocular infections?

    (a) Most eye infections respond well to anti-bacterial eye drops.
    (b) Conjunctivitis is the most common ocular infection.
    (c) Infectious keratitis does not cause blindness.
    (d) Optometrists can safely manage keratitis infections.

16. The study of microbiology can best be described as:

    (a) The study of bacteriology, virology and mycology only.
    (b) The study of all living macroscopic unicellular plants and animals.
    (c) The study of microscopic organisms only visible with an electron microscope.
    (d) The study of prokaryotic organisms only.

17. Which of the following statements is true of viruses?
    (a) Viruses can survive independently outside other cells.
    (b) The word virion is mostly used for a complete virus.
    (c) A bacteriophage is a human cell that has been infected by a virus.
    (d) The Adenovirus which affects adenoids is an enveloped virus.

18. During binary fission the correct sequence of events is:
    (a) DNA replication- chromosome segregation-cytokinesis.
    (b) DNA replication- cytokinesis -chromosome segregation.
    (c) Chromosome segregation - DNA replication-cytokinesis.
    (d) Chromosome segregation - cytokinesis-DNA replication.

19. When using Gram's stain which sequence is true?
    (a) Fixation-Crystal Violet-Iodine treatment-Decolorization-Safranin counter stain.
    (b) Fixation- -Decolorization- Crystal Violet-Iodine Treatment-Safranin counter stain.
    (c) Fixation- Iodine treatment -Crystal Violet-Decolorization-Safranin counter stain.
    (d) Fixation-Crystal Violet-Iodine treatment- Safranin counter stain - Decolorization.

20. When working in the laboratory the process of asepsis is best described as:
    (a) Routine that is involved in cleaning petri dishes only.
    (b) A routine that ensures that everything used in an experiment is sterilized.
    (c) The commonly used sterilant liquid is 7% alcohol.
    (d) This routine is only necessary after the experiment is finished.

21. Which of the following bacteria are specific with Gram's stain?
    (a) Mycobacteria
    (b) chlamydia
    (c) Spirochetes
    (d) All the above

22. Which of the following bacteria is positive for acid-fast stain?
    (a) Mycobacteria
    (b) chlamydia
    (c) Spirochetes
    (d) M. pneumonia

23. Which of the following bacteria is better stained with Giemsa or other tissue stain?
    (a) Mycobacteria
    (b) chlamydia
    (c) Spirochetes
    (d) Rickettsia

24. Which of the following is not an acid-fast staining method?
    (a) Gram's stain method
    (b) Carbol Fuchsin method
    (c) Fluorochrome method
    (d) Ziehl-Neelsen method

25. Which of the following bacteria structure is responsible for adherence to surfaces
    (a) Capsule
    (b) Glycocalyx
    (c) Cell wall
    (d) Flagella

26. Which of the following describes bacteria that grow below 25° Centigrade?
    (a) Halophiles
    (b) Psychrophiles
    (c) Osmophiles
    (d) Thermophiles

27. Which of the following best describes the most pathogenic bacteria to man?
    (a) Halophilic
    (b) Psychrophilic
    (c) Osmophilic
    (d)Thermophilic

28. Which is the most predominant chemical composition of the cytoplasmic membrane?
    (a) Polysaccharide
    (b) Peptidoglycan
    (c) Lipid
    (d) Lipid and polysaccharide

29. Which is the most predominant chemical composition of flagella?
    (a) Protein (flagellin)
    (b) Glycoprotein (pilin)
    (c) DNA
    (d) Keratin

30. Which is the most predominant chemical composition of pilus and fimbriae?
    (a) Protein (flagellin)
    (b) Glycoprotein (pilin)
    (c) DNA
    (d) Keratin

31. Which are the major defence mechanisms against ocular infections?
    (a) The tears and the conjunctiva only
    (b) The tears, the cornea and the conjunctiva
    (c) The conjunctiva and the cornea only
    (d) The tears and the eyelids only

32. Which of the most significant anti-infection components of the tears?
    (a) IgA and Lysozyme
    (b) IgA and plasma cells
    (c) IgA and neutrophils
    (d) Lysozyme and Lymphocytes

33. Which of the most significant anti-infection components of the conjunctiva?
    (a) IgA and Lymphocytes
    (b) Lymphocytes, Plasma cells, Neutrophils and Mast cells
    (c) Plasma cells and Mast cells only
    (d) Lymphocytes and Neutrophils only

34. Which are the commonest infection control mechanisms into the posterior segment?
    (a) The physical barrier by the sclera and cornea
    (b) Antibodies found in blood
    (c) General hygiene
    (d) All the above

35. Which statement best describes Ophthalmia Neonatorum?
    (a) It is an acute or severe conjunctivitis found in new born babies
    (b) It is a very rare blinding disease
    (c) It is a persistent inflammatory response due to ocular fungal infections
    (d) It is an infection of the uveal tract

36. Which is the commonest eye infection that can be caused by both bacteria or viruses?
    (a) Endophthalmitis
    (b) Ophthalmia Neonatorum
    (c) Blepharitis
    (d) Pink Eye (allergic conjunctivitis)

37. Which are the different types of allergic conjunctivitis?
    (a) Seasonal allergic conjunctivitis (SAC) and Perennial allergic conjunctivitis (PAC)
    (b) Vernal keratoconjunctivitis (VKC) and Atopic keratoconjunctivitis (AKC)
    (c) Giant Papillary conjunctivitis (GPC)
    (d) All the above

38. Which statement is true of viral conjunctivitis?
    (a) It is highly infectious but self-limiting
    (b) The follicular conjunctivitis can be associated with respiratory symptoms
    (c) There can be lid oedema and conjunctival haemorrhages
    (d) All the above

39. Which of the following terms best describes entry of a virus into a cell?
    (a) Ectocytosis
    (b) Endrocytosis
    (c) Endocytosis
    (d) Extrocytosis

40. Which are the best drugs that can stop viral action?
    (a) Drugs that inhibit attachment, penetration and early replication
    (b) Drugs that interfere with viral nucleic acid replication
    (c) Drugs that interfere with translation
    (d) All the above.

SECTION (2): ANSWER Any 3 QUESTIONS

1. (a) Make labelled diagrams showing the features of a typical prokaryotic cell and a typical eukaryotic cell.

   (b) Detail the main differences between these two types of cells mentioning the functions of the cell inclusions in each case. **[20 MARKS]**

2. (a) Define Sterilization and (b) Select any 4 methods of sterilization and give examples of equipment or material that can be sterilized using each method. **[20 MARKS]**

3. Discuss two ocular infections caused by fungi and basic management. **[20 MARKS]**

4. (a) Outline the viral life cycle beginning from the point it approaches a host cell. (b) Describe the Adenovirus and its ocular manifestations. **[20 MARKS]**

5. (a) Discuss the term Disinfectant and name two examples of such chemicals and (b) Define the term antiseptic and the name two typical such chemicals. **[20 MARKS]**

END OF PAPER