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University Examinations 2024/2025

THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF MEDICAL MICROBIOLOGY

HMM 3314: DIAGNOSTIC BACTERIOLOGY

DATE: JANUARY 2025

TIME: 3 HOURS

INSTRUCTIONS:

Answer *All* questions

Ensure that all your answers are properly numbered

Part I multiple Choice Questions (MCQ): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark

Part II: Short Answer Questions – Answer questions following each other on the answer booklet

Part III: Long Answer Questions – Answer each question on the answer booklet

SECTION A: MULTIPLE CHOICE QUESTIONS (20 marks)

1. The following are bacteriological indicator organisms except
 - a. *Escherichia coli*
 - b. *Clostridium botulinum*
 - c. *Clostridium perfringens*
 - d. *Streptococcus faecalis*
2. Why is a Durham tube inserted in Lauryl sulphate lactose broth during water analysis?
 - a. To allow growth and multiplication of the bacteria

- b. To determine the amount of lactose fermented by the bacteria
- c. To preserve the bacteria found in water
- d. To detect production of gas by the bacteria

3. Gas gangrene bacillus is a

- a. Facultative anaerobe
- b. Obligate anaerobe
- c. Facultative aerobe
- d. Obligate aerobe

4. Niacin test is positive in case of

- a. *Corynebacterium*
- b. *M. tuberculosis*
- c. *M. bovis*
- d. *M. avium*

5. Lepromin test

- a. Is negative in tubercular leprosy
- b. Positive in lepromatous type
- c. Indicated delayed hypersensitivity test
- d. Indicates infection

6. Nagler reaction detects

- a. *Corynebacterium diphtheriae*
- b. *Clostridium tetani*
- c. *Clostridium perfringens*
- d. *Clostridium botulinum*

7. The following infections are caused by Escherichia Coli, except;

- a. Urinary tract infections
- b. Septic infections of wounds
- c. Diarrhoea
- d. Dysentery

- e. Meningitis

8. Tetanus is caused by spread of

- a. Exotoxin in sympathetic system
- b. Exotoxin in para sympathetic system
- c. Endotoxin in sympathetic system
- d. Endotoxin in parasympathetic system

9. Erythromycin inhibits protein synthesis by

- a. Attaching to 30 S ribosome unit
- b. Attaching to 50 S unit or ribosome
- c. Attachment to t-RNA
- d. Attachment to m-RNA

10. Bacitracin sensitivity test is done for identification of

- a. Pneumococci
- b. Group 'A' Streptococci
- c. Gonococci
- d. Staphylococci

11. Staphylococcus bacteria secrete all of the following, EXCEPT:

- a. Lipase
- b. Cellulase
- c. Coagulase
- d. Lecithinase

12. Medusa head types of colonies are found in:

- a. Clostridium
- b. Bacillus
- c. Pseudomonas
- d. E. coli

13. Which of the following is an obligate anaerobe?

- a. *Clostridium spp*

- b. *Bacillus spp*
 - c. *Staphylococcus spp*
 - d. *Klebsiella spp*
- 14. Positive tuberculin test is an example of:
 - a. *hypersensitivity type-I*
 - b. *hypersensitivity type-II*
 - c. *hypersensitivity type-III*
 - d. *hypersensitivity type-IV*
- 15. Which stage of syphilis disease has disseminating rash, alopecia, lymphadenopathy, & flulike symptoms?
 - a. Primary syphilis
 - b. Secondary syphilis
 - c. Tertiary syphilis
 - d. Congenital syphilis
- 16. Swarming growth of colonies is the characteristic of Gram negative bacteria known as:
 - a. Clostridium
 - b. Proteus
 - c. Pasteurella
 - d. Pseudomonas
- 17. _____ is/are used to determine glucose fermentation by bacteria.
 - a. Methyl red test
 - b. TSI test
 - c. Urease test
 - d. Methyl Red test and TSI test
- 18. Metachromatic granules are found in:
 - a. Mycoplasma
 - b. Tuberculosis
 - c. Diphtheria

d. Tetanus

19. In the human body "Brucella" resides in the:

- Reticuloendothelial system
- Respiratory tract
- Genital Tract
- Gastrointestinal tract

20. How are most cases of listeriosis transmitted?

- Insect vectors
- Respiratory secretions
- Transplacental
- Contaminated food

SECTION B: SHORT ANSWER ALL QUESTIONS (40 MARKS)

- Describe isolation and identification of *Neisseria gonorrhoea* in suspected STDs. (5 marks)
- Describe the fluorescent microscopy for diagnosis of pulmonary tuberculosis. (5 marks)
- Highlight the principle and applications of anti-streptolysin O (ASOT) test (5 marks)
- There has been an ESBL producing *Klebsiella pneumoniae* outbreak in the paediatric wards in of your hospital and the infection control team have highlighted a need to rapidly introduce a screening method. Describe the process you would go through to enable this. (5 marks)
- Following a run of the quality control samples through the urine analyser you notice the 10m Westgard rule has been breached. Explain this rule and suggest likely causes of the breach and any actions that should be taken (5 marks)
- Outline the laboratory diagnosis of syphilis (5 marks)
- Describe applications of the quellung reaction and state the control organisms used (5 marks)
- Describe laboratory diagnosis of sexually transmitted *Chlamydia trachomatis* (5 marks)

SECTION C: LONG ANSWER TWO QUESTIONS (40 MARKS)

1. Describe the methodology for phenotypic disk diffusion method then discuss the factors that influence zones of inhibition in drug susceptibility testing. (20 Marks)
2. Using examples, discuss diagnostic applications of inflammatory biomarkers. (20 Marks)
3. (a) Discuss various methods for QA/QC in a microbiology laboratory. (14 Marks)
(b) Describe the principle for the GeneXpert and its significance in diagnosis of tuberculosis (6 Marks)