UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION

MARCH 2025 SEMESTER

COURSE CODE	:	HDD20903
COURSE TITLE	:	DIAGNOSTIC MICROBIOLOGY
PROGRAMME NAME	:	DIPLOMA OF MEDICAL LABORATORY TECHNOLOGY
DATE	:	02 JULY 2025
TIME	:	9:00AM - 12:00PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Section A consist 25 MCQ or EMQ questions. Answer ALL questions.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 11 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 25 marks)

Answer ALL questions.

Please use the objective answer sheet provided.

1. The streak plate method (i.e., done with the loop) helps us to achieve the following except;

   A. determination of colonial characteristics.

   B. determination of Gram characteristics.

   C. determination of the purity of the culture.

   D. isolation of the different organisms in a mixed culture.

2. _____ is Gram positive rod and spore-forming bacteria.

   A. *Staphylococcus* sp.

   B. *Pseudomonas* sp.

   C. *Bacillus* sp.

   D. *Salmonella* sp.

3. _____ agar is commonly used to isolate urine pathogens.

   A. EMB

   B. Nutrient

   C. CLED

   D. Blood

4. _____ agar can be used to isolate fungus.

   A. Mac Conkey

   B. Eosin-Methylene Blue (EMB)

   C. Motility

   D. Sabauroud Dextrose Agar (SDA)

5. _____ technique can be used to isolate bacteria from a mixed culture.

   A. Spread

   B. Streaking

   C. Lawn

   D. Stab

6. Septicemia is a _____ infection.

   A. skin

   B. lung

   C. brain

   D. blood

7. All of the following bacteria are members of family *Enterobacteriaceae* except:

   A. *Staphylococcus* sp.

   B. *E. coli*

   C. *Salmonella* sp.

   D. *Shigella* sp.

8. _____technique requires previously diluted samples carpeted over agar plate.

   A. Streak plate

   B. Pour plate

   C. Stab tube

   D. Spread plate

9. *Helicobacter pylori* possesses_____ that helps to neutralize stomach acid (HCl).

   A. hyaluronidase

   B. catalase

   C. coagulase

   D. urease

10. _____ can be used to differentiate *Staphylococcus* sp. and *Streptococcus* sp.

    A. Blood agar

    B. Catalase test

    C. Mac Conkey agar

    D. Coagulase test

11. Which of the following test is used to differentiate *Streptococcus* from *Staphylococcus?*

    A. Catalase test

    B. Coagulase test

    C. Indole test

    D. Phosphatase

12. Identify the most common pathogenic *Candida* species.

    A. *Candida glabrata*

    B. *Candida tropicalis*

    C. *Candida albicans*

    D. *Candida krusei*

13. Production of hydrogen sulphide by _____ can easily be determined by conducting TSI test.

    A. *Salmonella typhi*

    B. *Pseudomonas aeruginosa*

    C. *Shigella* sp.

    D. *Vibrio cholera*

14. A urine specimen was cultured on MacConkey agar using 0.01ml inoculating loop. On the following day, 30 colonies were found on the agar. Calculate the CFU/ml of the urine specimen.

    A. 300 CFU/mL

    B. 30 CFU/mL

    C. 3000 CFU/mL

    D. 30000 CFU/mL

15. Which of the following virus is not associated with respiratory infections?

    A. RSV

    B. *Adenovirus*

    C. Influenza virus

    D. *Rotavirus*

16. Mannitol salt agar is an example of _____.

    A. selective medium

    B. enriched medium

    C. differential medium

    D. both selective and differential medium

17. Syphillis is caused by _____.

    A. *Mycobacterium tuberculosis*

    B. *Neisseria gonorrhea*

    C. *Human papilloma virus*

    D. *Treponema pallium*

18. MacConkey agar inhibits the growth of _____.

    A. Gram negative bacteria

    B. viruses

    C. Gram positive bacteria

    D. Gram variable

19. The coagulase test is used to differentiate between *Staphylococcus aureus* from_____.

    A. other *staphylococci* sp.

    B. *Micrococci* sp.

    C. *Enterococci* sp.

    D. *Streptococci* sp.

20. Which of the following is a non-culture method used to diagnose *Helicobacter pylori* infection?

    A. Urea breath test

    B. Susceptibility test

    C. Gram's stain

    D. Biochemical tests

21. In positive catalase test, the interaction of enzyme catalase and _____ will produce oxygen molecules.

    A. Kovac's reagent

    B. methyl red

    C. carbon dioxide

    D. hydrogen peroxide

22. Identify the correct statement about hemolysis.

    A. Beta means no hemolysis.

    B. Delta means incomplete hemolysis.

    C. Gamma means complete hemolysis.

    D. Alpha means incomplete hemolysis.

23. Generally, the pathogens causing reproductive tract infection (RTI) enter the body through _____ during unprotected vaginal, anal, or oral intercourse with an infected partner.

    A. skin

    B. blood

    C. urine

    D. mucous membrane

24. If fecal pathogens are detected in a food sample, the food is considered _____.

A. safe to eat

B. sterile

C. infected

D. contaminated

25. For fungi and slow-growing bacteria, blood cultures are incubated for _____ before being reported as negative.

A. one week

B. four days

C. five days

D. three days

SECTION B (Total: 75 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Discuss the principles, procedures, and diagnostic significance of Gram staining in microbiology.

(25 marks)

Question 2

The identification of bacterial pathogens in clinical samples involves a series of microbiological, biochemical, and molecular techniques. These methods help detect, isolate, and identify the causative agents of infection.
Outline five techniques used for the identification of bacterial pathogens in clinical samples.

(25 marks)

Question 3

Answer the following Quality Assurance (QA) questions related to Diagnostic Microbiology.

(a) What is the purpose of quality assurance in a microbiology laboratory?

(5 marks)

(b) Why must media be checked before use in the lab? List four things that should be checked.

(5 marks)

(c) State the consequences of poor quality assurance in diagnostic microbiology?

(5 marks)

(d) Describe five factors that can affect the quality of a microbiological specimen.

(10 marks)

Question 4

Case Scenario:
Mrs. Amina Yusuf, a 62-year-old woman with a history of type 2 diabetes mellitus, visits the clinic complaining of fever, lower abdominal pain, increased urinary frequency, urgency, and burning sensation during urination.
A midstream urine (MSU) sample was collected and sent to the microbiology lab for routine culture and sensitivity.
In the lab, the urine was cultured using a calibrated loop onto CLED and MacConkey agar and incubated at 37°C for 24 hours. The culture yielded a pure growth of lactose-fermenting colonies, $>10^5$ CFU/mL. Gram staining of the isolate showed Gram-negative bacilli. The organism was oxidase-negative, indole-positive, and motile.
Based on the case study, answer the following questions:

(a) What is the likely diagnosis for Mrs. Yusuf? Briefly explain your reasoning.

(5 marks)

(b) Explain why CLED and MacConkey agars were used for this culture.

(5 marks)

(c) Identify the most likely causative organism based on the culture characteristics and biochemical test results. Justify your answer.

(5 marks)

(d) Interpret the colony count result ($>10^5$ CFU/mL) and explain its significance.

(4 marks)

(e) Discuss the importance of proper urine specimen collection and transport in this case.

(6 marks)

END OF EXAMINATION PAPER