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QUALIFICATION : BACHELOR of MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	LEVEL: 6
COURSE: MEDICAL MICROBIOLOGY 2B	COURSE CODE: MMB621S
DATE: JANUARY 2025	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY: EXAMINATION PAPER

EXAMINER: ***MRS FREDRIKA ENGELBRECHT***

MODERATOR: ***MS VANESSA TIJENDA***

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator

ATTACHEMENTS

1. NONE

This paper consists of 6 pages including this front page

QUESTION 1: MULTIPLE CHOICE QUESTIONS

[20 MARKS]

- 1.1 Quinolone antimicrobials substances act through:
A) the inhibition of DNA synthesis.
B) the inactivation of cell wall synthesis.
C) the disruption of cytoplasmic membranes.
D) Inhibition of RNA synthesis. (1)
- 1.2 The sample required for diagnosing the causative organism for infective endocarditis is a:
A) nasopharyngeal swab.
B) blood culture.
C) urine sample.
D) tissue biopsy. (1)
- 1.3 Bacteria that are intrinsically resistant to an antibiotic can be defined as:
A) organisms that have inherent resistance to the drug.
B) organisms that are resistant to the drug in the presence of another drug.
C) organisms that received a resistance gene from another organism.
D) organisms that developed resistance when exposed to the drug. (1)
- 1.4 How will you distinguish between *Nocardia* and *Asteroides* species?
A) The gram stain.
B) Haemolysis on the blood agar.
C) Bile esculin test.
D) The Ziehl-Neelson stain. (1)
- 1.5 Gram stained smear of lesion material that reveal a "school of fish" is associated with:
A) *Campylobacter* species
B) *Haemophilus influenza*
C) *Campylobacter jejuni*
D) *Haemophilus ducreyi* (1)
- 1.6 Bacterial cross-resistance refers to:
A) One change that result in resistance to several drugs.
B) Resistance constantly expressed.
C) Resistance expressed when micro-organism is exposed to a specific drug.
D) Resistance expressed by an entire population. (1)

- 1.7 Sources of error that needs to be considered for the Citrate utilisation test includes:
- A) a light inoculum.
 - B) a heavy inoculum.
 - C) the incubation time of the test.
 - D) an excess of oxygen. (1)
- 1.8 Mycoplasma can be defined as:
- A) a gram negative bacilli.
 - B) an intracellular parasite.
 - C) the smallest self-sufficient bacteria.
 - D) a common causative organism of eye infections. (1)
- 1.9 The best treatment for coagulase negative staphylococci nosocomial infection obtained through intravenous catheters and the patient keep on presenting with a fever is:
- A) a two week course of anti-staphylococcal therapy.
 - B) a 48 hour glycopeptide antibiotic treatment.
 - C) a three day treatment with tetracycline.
 - D) a seven day macrolide drug treatment. (1)
- 1.10 A positive D-test means:
- A) that clindamycin can be reported as sensitive.
 - B) that both clindamycin and erythromycin is sensitive.
 - C) that both clindamycin and erythromycin should be reported as resistant.
 - D) that erythromycin can be reported as sensitive. (1)
- 1.11 *N. asteroides* and *A. israelii* can be distinguished by means of:
- A) gram stain reaction.
 - B) Ziehl-Neelson reaction.
 - C) Albert stain reaction.
 - D) Capsular stain reaction. (1)
- 1.12 Bacterial antigens associated with motile organisms are:
- A) K antigens
 - B) H antigens
 - C) O antigens
 - D) K and O antigens (1)
- 1.13 From a rice water stool sample one expects to isolate:
- A) Campylobacter species.
 - B) Enteroinvasive *E.coli*.
 - C) *Vibrio cholera*.
 - D) *Haemophilus ducreyi*. (1)

- 1.14 Urine samples for microbiological analysis, transported at room temperature, should reach the diagnostic laboratory:
A) 30 minutes after collection.
B) 24 hours after collection.
C) 12 hours after collection.
D) 1 – 2 hours after collection. (1)
- 1.15 *Yersinia enterocolitica* is responsible for causing:
A) relapsing fever.
B) bubonic plague.
C) typhoid fever.
D) mesenteric lymphadenitis. (1)
- 1.16 Septicaemia can be defined as:
A) Bacteria present in the blood in very low levels after dental work.
B) Bacteria present in the blood of a patients but usually not life threatening.
C) Intermitted presence of bacteria in the blood.
D) Overwhelming bacterial invasion of the bloodstream from a focal point of infection. (1)
- 1.17 An example of a sterile site in the human body is:
A) serous fluids.
B) female genital tract.
C) the upper respiratory tract.
D) the skin. (1)
- 1.18 The Salmonellae Vi antigen:
A) Is fimbrial antigens.
B) Exhibit the property of diphasic variation.
C) Is an acidic polysaccharide antigen that overlay the O antigen.
D) Is determined by the complete sugar sequence. (1)
- 1.19 The virulence factors of *Shigella dysenteriae* that is associated with the diarrhoeal symptoms are known as:
A) The shiga toxin.
B) The invasion plasmid antigens B and C.
C) The intercellular A and B proteins.
D) Enterotoxins. (1)
- 1.20 Brucella is an organism known to be:
A) often transferred from person to person.
B) a zoonotic infection.
C) only causing infections amongst animals.
D) not a pathogenic organism. (1)

QUESTION 2: TRUE/FALSE QUESTIONS**[15 MARKS]**

Evaluate the statements and select whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number on your ANSWER BOOK and **give a reason for calling any statement FALSE. One mark allocation to calling the statement TRUE or FALSE, and one mark allocated to the REASON given when calling a statement FALSE.**

- 2.1 *R. prowazekii* enters the human body directly and cause and infection.
- 2.2 Heparinase that contributes to intravascular clotting is part of the virulence factors presented by *Bacteroides fragilis*.
- 2.3 The causative pathogen for the emetic type of food poisoning associated with fried rice is known as *B. subtilis*.
- 2.4 K antigens are only present on motile bacteria.
- 2.5 Transient bacteraemia in a patient will present with multiple positive blood cultures obtained over several hours.
- 2.6 Gram negative cocci usually in pairs (diplococci) with flattened adjacent sides "Kidney bean"/"Coffee bean" shape are associated with *Acinetobacter* species.
- 2.7 Indole differentiates between *Proteus vulgaris* and *Proteus mirabilis*.
- 2.8 *Klebsiella pneumoniae* form mucoid non-lactose fermenting colonies on the MacConkey agar.
- 2.9 The anthrax toxin causes an increase in vascular permeability resulting in shock.

SECTION B: SHORT/LONG ANSWER QUESTIONS**[65 MARKS]**

Please answer ALL of the questions in this section.

QUESTION 3:**[12 MARKS]**

- 3.1 Compare *C. perfringens* and *C. tetanus* under the following headings, using a table.

- 3.1.1 Gram reactivity,
- 3.1.2 Spores form and location,
- 3.1.3 Haemolysis,
- 3.1.4 Motility,
- 3.1.5 Lecithinase production and
- 3.1.6 Glucose fermentation.

(12)

QUESTION 4**[5 MARKS]**

4.1 Discuss the principle of the ONPG test.

(5)

QUESTION 5**[14 MARKS]**

5.1 Summarize some of the mechanisms used by bacteria to resist the effects of antibiotics and give an example for each of the mentioned mechanisms. (8 x ½ = 4)

5.2 Propose factors affecting the quality of the final microbiological report, and explain why these factors affects the quality. (10)

QUESTION 6**[16]**

6.1 A patient is presenting with a very sore throat. The doctor submits a throat swab to your diagnostic medical microbiology laboratory.

6.1.1 Discuss how you would go about processing this sample and justify your suggestions. (6)

6.1.2 Name the expected pathogen? (1)

6.1.3 Illustrate, by using a flow chart, how you would identify the organism in question 6.1.2 from the gram stain up to organism identity. (9)

QUESTION 7**[18]**

7.1 Please answer questions 7.1.1 – 7.1.3 on the Elek test:

7.1.1 Discuss the principle of the Elek test. (2)

7.1.2 Explain how the Elek test is performed. (5)

7.1.3 Illustrate, using a labelled drawing, how a positive and negative Elek test would look in the diagnostic laboratory. (5)

7.2 Discuss the cultural characteristics of *B. anthracis*. (6)

END OF QUESTION PAPER

