CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF SCIENCE (NURSING)

NURU 121: MEDICAL MICROBIOLOGY 1

STREAMS: BSC (NURSING UPGRADING)

TIME: 2 HOURS

DAY/DATE: TUESDAY 13 /07/ 2021 **8.30 AM – 10.30 AM**

INSTRUCTIONS:

- Answer ALL questions
- Do not write anything on the question paper
- This is a **closed book exam**, No reference materials are allowed in the examination room
- There will be **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

SECTION A (35 marks)

1. During which phase of the bacterial growth curve are antibiotics such as penicillin most likely to kill bacteria? _____
2. The colon is the site of the largest number of normal flora bacteria. The bacteria found in the greatest number in the colon is
    a. *Bacteroides fragilis*
    b. *Escherichia coli*
    c. *Enterococcus faecalis*
    d. *Lactobacillus* species
3. If the venipucture site is inadequately disinfected, blood cultures are most often contaminated with
    a. *Streptococcus pyogenes*
    b. *Escherichia coli*
    c. *Staphylococcus epidermidis*
    d. *Pseudomonas aeruginosa*

4. Which of the following chemicals is used to sterilize heat sensitive surgical instruments?
    a. Benzalkonium chloride
    b. Formaldehyde
    c. Hypochlorite solution
    d. Ethylene oxide
5. The laboratory technician concludes that a patient has *Staphyloccus epidermidis* bacterimea. Which one of the following sets of results did the technician find with the organism recovered from the blood culture?
    a. Gram-positive cocci in chains, catalase positive, coagulase positive
    b. Gram-positive cocci in chains, catalase negative, coagulase negative
    c. Gram-positive cocci in clusters, catalase positive, coagulase negative
    d. Gram-positive cocci in clusters, catalase negative, coagulase positive
6. Which of the following laboratory tests is the most appropriate to distinguish *Streptococcus pyogenes* from other β-hemolytic streptococci?
    a. Ability to grow in 6.5% Nacl
    b. Hydrolysis of esculin in the presence of bile
    c. Inhibition by optochin
    d. Inhibition by bacitracin
7. Which of the following statements regarding the differences between *Neisseria meningitidis* (meningococci) and *Neisseria gonorrheae* (gonococci) is the most accurate?
    a. Meningococci are oxidase-positive whereas gonococci are not
    b. Meningococci have a thick polysaccharide capsule where as gonococci do not
    c. Meningococci have lipid A whereas gonococci do not have
    d. Meningococci synthesize IgA protease whereas gonococci do nor
8. Your patient is a 20-year-old man with urethral exudate. You do a Gram stain of the pus and see gram-negative diploccocci with neutrophils. Which is the best antibiotic to treat the infection?
    a. Norfloxacin and Doxycycline
    b. Metronidazole and clotrimazole
    c. Norfloxacin and clotrimazole
    d. Doxycycline and clotrimazole
9. Which of the following is a large gram-positive rod that causes necrosis of tissue by producing an exotoxin that degrades lecithin, leading to lysis of cell membranes?
    a. *Bacillus anthracis*
    b. *Bacillus cereus*
    c. *Clostridium perfringens*
    d. *Corynebacterium diphtheria*

10. A two-week-old boy is admitted in the intensive care unit with fever and signs of meningitis. Gram stain of the spinal fluid reveals small gram-positive rods. Colonies on

blood agar show a narrow zone of β-hemolysis. Which is the most likely cause of the neonatal meningitis?

a. *Bacillus anthracis*
b. *Neisseria meningitidis*
c. *Clostridium perfringens*
d. *Listeria monocytogenes*

11. A 30-year-old man who works in an abbatoir has a 2-cm lesion on his arm. The lesion began as a painless papule that enlarged and within a few days ulcerated and formed a black crust. A Gram stain of fluid from the lesion reveals large gram-positive rods. Which is the most likely bacteria?
    a. *Bacillus anthracis*
    b. *Clostridium botulinum*
    c. *Clostridium perfringens*
    d. *Clostridium tetani*
12. A patient has third-degree burns over most of his body. He was doing well until two days ago he developed fever and his dressing revealed pus that had a blue-green color. Gram stain of the pus revealed a gram-negative rod that formed colorless colonies on EMB agar. Which of the following bacteria is the most likely cause of the infection
    a. *Campylobacter jejuni*
    b. *Escherichia coli*
    c. *Haemophilus influenza*
    d. *Pseudomonas aeruginosa*
13. Regarding members of the family Enterobacteriaceae, which of the following is most accurate?
    a. All the members of the family are anaerobic
    b. All the members of the family ferment lactose
    c. All the members of the family have an endotoxin
    d. All the members of the family produce an enterotoxin
14. A patient is seen in the outpatient clinic complaining of epigastric pains which gets relieved by antacids for several months. After taking complete history and doing a physical exam, you discuss the case with the clinician who suggests doing a urea breath test. Which of the following bacteria does the clinician think is the most likely cause of the patient's disease?
    a. *Helicobacter pylori*
    b. *Shigella dysenteriae*
    c. *Proteus mirabilis*
    d. *Salmonella typhi*
15. A 75-year-old man who has smoked for the last 50 years and consumed alcohol for most of his adult life has signs and symptoms of pneumonia. Gram stain of his sputum reveals polymorphonuclear cells but no bacteria. Colonies appear on buffered charcoal yeast agar

but not on blood agar. Which of the following bacteria is the most likely cause of his pneumonia?

a. *Legionella pneumophilla*
b. *Kleibsiella pneumoniae*
c. *Haemophilus influenza*

16. When preparing surgical instruments for sterilization, the instruments are soaked in 0.5% chlorine solution. The nurse understands that this
    a. Gets rid of all micro-organisms from the instruments
    b. Is a world health organization recommendation
    c. Makes the instruments safe for handling during processing
    d. Is in the nurse's scope of practice
17. A culture of skin lesions from a patient with impetigo shows numerous colonies surrounded by a zone of beta hemolysis on a blood agar plate. A Gram-stained smear shows gram-positive cocci. A catalase test was negative. Which was the most probable organism isolated?
    a. *Streptococcus pyogenes*
    b. *Staphylococcus aureus*
    c. *Staphylococcus epidermidis*
    d. *Streptococcus pneumonia*
18. The pathogenesis of which one of the following organisms is most likely to involve invasion of the intestinal mucosa?
    a. *Vibrio cholerae*
    b. *Shigella sonnei*
    c. Enterotoxigenic *Escherichia coli*
    d. *Clostridium botulinum*
19. For which of the following enteric illnesses is a chronic carrier state MOST likely to develop
    a. Campylobacter enterocolitis
    b. Shigella enterocolitis
    c. Cholera
    d. Typhoid fever

For questions 20 -30 select the ONE lettered option in the choices provided (i to xii) that is most closely associated with the numbered item

20. Causes atypical pneumonia in immunosuppresed and neonates
21. Grows in 6.5% sodium chloride
22. Anaerobic gram-negative rod that is important cause of peritonitis
23. Is bile soluble
24. Peptic ulcer disease
25. Flaccid paralysis

26. Produces enterotoxin
27. Associated with rheumatic fever
28. Does not grow on artificial media
29. Common cause of urinary tract infection
30. Not bile-soluble and not inhibited by optochin

Choices

i. *Treponema pallidum*
ii. *Viridans group of streptococci*
iii. *Escherichia coli*
iv. *Clostridium botulinum*
v. *Helicobacter pylori*
vi. *Clostridium tetani*
vii. *Staphylococcus aureus*
viii. *Streptococcus pyogenes*
ix. *Enterococcus faecalis*
x. *Streptococcus pneumoniae*
xi. *Bacteriodes fragilis*
xii. *Chylamydia pneumoniae*

SECTION B (20 MARKS)

1. State five (5) important properties of *Myocobacteria tuberculosis* (5 marks)
2. Describe Koch postulates (5 marks)
3. state five (5) virulent factors of *Streptococus pyogenes* (5 marks)
4. state five (5) factors that influence bacterial infections in human beings (5 marks)

SECTION C (20 MARKS)

1. Staphylococcus aureus causes various skin infections
    a. Describe five important properties of S.aureus (5 marks)
    b. Describe the pathogenesis of the following conditions associated with S.aureus:
        i. Gastroenteritis
        ii. Toxic shock syndrome
        iii. Scalded skin syndrome (12 marks)
    c. State three antibiotics that may be used in the treatment of staphylococcal infections . (3 marks)

……..