

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATION
RESIT/SPECIAL EXAMINATIONS**

**FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
SCIENCE IN NURSING**

NURU 121: MEDICAL MICROBIOLOGY 1

STREAMS: BSC NURSING -UPGRADING

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 05/05/2021

2.30 P.M – 4.30 P.M

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 (20 marks)

1. During which phase of the bacterial growth curve are antibiotics such as penicillin most likely to kill bacteria? _____
2. What term denotes the transfer of plasmids carrying one or more transposons through a sex pilus? _____

3. 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
4. If the venipuncture site is inadequately disinfected, blood cultures are most often contaminated with
 - a. *Streptococcus pyogenes*
 - b. *Escherichia coli*
 - c. *Staphylococcus epidermidis*
 - d. *Pseudomonas aeruginosa*
5. Which of the following chemicals is used to sterilize heat sensitive surgical instruments?
 - a. Benzalkonium chloride
 - b. Formaldehyde
 - c. Hypochlorite solution
 - d. Ethylene oxide
6. The laboratory technician concludes that a patient has *Staphylococcus epidermidis* bacteremia. 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
7. 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

8. Which of the following statements regarding the differences between *Neisseria meningitidis* (meningococci) and *Neisseria gonorrhoeae* (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 not
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 abattoir 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. *Klebsiella pneumoniae*
 - c. *Haemophilus influenza*
 - d. *Bordetella pertussis*

16. A 60-year-old woman with a history cigarette smoking has a fever of 39°C and a cough productive of yellowish sputum. Gram stain of the sputum shows gram-negative rods. There is no growth on blood agar but colonies grow on chocolate agar enriched with hemin and NAD. The most likely cause of her pneumonia is
- Legionella pneumophilla*
 - Klebsiella pneumoniae*
 - Haemophilus influenza*
 - Bordetella pertussis*
17. A 20-year-old patient has urethral discharge. Gram stain of the pus shows many neutrophils but no bacteria. You suspect the infection may be caused by *Chlamydia trachomatis*. Which one of the following laboratory results best supports your diagnosis?
- The organism produces beta-hemolytic colonies on blood agar plate when incubated
 - The organism produces alpha-hemolytic colonies on blood agar plate when incubated
 - Fluorescent antibody staining of cytoplasmic inclusions in epithelial cells in the exudates
 - Four-fold or greater rise in antibody titer against *C.trachomatis*
18. 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?
- Streptococcus pyogenes*
 - Staphylococcus aureus*
 - Staphylococcus epidermidis*
 - Streptococcus pneumonia*
19. The pathogenesis of which one of the following organisms is most likely to involve invasion of the intestinal mucosa?
- Vibrio cholerae*
 - Shigella sonnei*
 - Enterotoxigenic *Escherichia coli*

d. *Clostridium botulinum*

20. 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

SECTION B (25 MARKS)

1. State five (5) important properties of *Mycobacteria tuberculosis* (5 marks)
2. Describe Koch postulates (5 marks)
3. state five (5) virulent factors of *Streptococcus pyogenes* (5 marks)
4. state five (5) factors that influence bacterial infections in human beings (5 marks)
5. describe five (5) methods of approaches that may be used in getting hospital equipment free of microorganisms (5 marks)

SECTION C (25MARKS)

1. Pyogenic meningitis is a common cause of childhood morbidity and mortality in developing countries.
 - a. Describe the morphology and staining properties of the three (3) leading causes of bacterial meningitis. (6 marks)
 - b. For one of the bacteria described in (a) above, describe the pathogenesis and virulent factors. (6 marks)
 - c. For each of the bacteria described in (a) above, indicate the antibiotic(s) of choice in its management (3 marks)
 2. Describe *Salmonella typhi* under:
 - a. Morphology and staining properties (2 marks)
 - b. Virulent factors (2 marks)
 - c. Pathogenesis (4 marks)
 - d. Signs and symptoms (2 marks)
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