AFRICA UNIVERSITY
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COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES
DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES

BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS DEGREE

SLS 404 : MICROBIOLOGY II
END OF SEMESTER EXAMINATIONS

November 2021

LECTURER: DR E. MUGOMERI

DURATION: 5 HOURS

INSTRUCTIONS

Do NOT write your name on the answer sheet.

Answer (fully) **any <u>One</u>** question of your choice.

Begin your answer for each question on a new page.

Each full question carries 100 marks.

Font: Times New Roman, Font size 12, Line space: 2.0.

Credit is given for neat, well-written work.

1. *Escherichia coli* (*E. coli*) is a gram-negative bacillus that is a causative organism of many diarrheal illnesses. Imagine you are in charge of a district microbiology laboratory and you are responsible for reviewing the different *E. coli* strains that cause human illness. You are also part of the hospital infection control committee. You often face challenges to identify and treat these illnesses despite your access to an interprofessional team in the care of patients with this condition.

    a. Write a draft of presentation notes you could use to describe the etiology of illnesses caused by *E. coli.* The presentation will be delivered to the interprofessional team of the hospital infection control committee. **(25)**

    b. Review the challenges the laboratory usually faces in conducting day-to-day appropriate laboratory diagnosis for *E. coli* infection. **(25)**

    c. Outline what antibiotics should be made available for treating *E. coli* infections and for each of these drugs; write to the pharmacist explaining how the drugs work against *E.coli* and explain your concerns about how drug resistance may occur against these drugs. **(25)**

    d. Summarize the importance of collaboration amongst the interprofessional team to enhance the care of patients with *E. coli* infection. Describe the key members of the interdisciplinary team and their roles in the infection control committee. **(25)**

2. Clinical microbiology laboratories play a pivotal role in infection control programmes. They have the first opportunity to detect infectious diseases and should participate in the surveillance of these infections. Describe in detail the role of the laboratory in the following towards infection control;

    a. Antimicrobial resistance **(20)**

    b. Food-borne and water-borne diseases **(20)**

    c. Vector-borne and zoonotic diseases **(20)**

    d. Diseases of pregnant women and newborns **(20)**

    e. New emerging pathogens **(20)**

3. An 18-year-old female patient presented to the emergency department (ED) complaining of severe headache, pain in her legs, nausea, vomiting, and fluid leaking from the site of a previous surgery on the central nervous system (CNS). Past history indicates that a central nervous system surgery was done approximately 6 weeks prior to visiting the ED. She had been seen in the ED twice in the past 2

weeks with migraine headaches and sinusitis. She underwent a spinal tap on both of these occasions and cerebrospinal fluid (CSF) cultures were done. The patient was taken for surgery, the previous CNS surgical incision was opened and a large amount of CSF that had pooled under the incision was collected. The CSF was submitted to the laboratory for Gram stain, cell count, glucose, total protein, culture and susceptibility testing. The patient was placed on vancomycin and cefotaxime therapy after the lab investigations.

a. Explain how you would process the CSF and what organisms you would most likely find and why. **(50)**

b. Describe the rationale for the drugs given to the patient and the mechanisms of action for these drugs. **(25)**

c. Describe the pathological mechanisms associated with 2 of the possible organisms involved. **(25)**

END