



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya

Tel: +254(0) 799 529 958, +254(0) 799 529 959, + 254 (0) 712 524 293,

Website: info@must.ac.ke Email: info@must.ac.ke

University Examinations 2023/2024

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN MEDICAL MICROBIOLOGY

HMM 3423: ANTIMICROBIAL AGENTS AND CHEMOTHERAPY

DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer ALL questions in section A and section B, and any other two questions in section C.

SECTION A - ANSWER ALL QUESTIONS

1. A scientist discovers that a soil bacterium he has been studying produces an antimicrobial that kills gram-negative bacteria. She isolates and purifies the antimicrobial compound, then chemically converts a chemical side chain to a hydroxyl group. When she tests the antimicrobial properties of this new version, she finds that this antimicrobial drug can now also kill gram-positive bacteria. The new antimicrobial drug with broad-spectrum activity is considered to be which of the following?
 - A. resistant
 - B. semisynthetic
 - C. synthetic
 - D. natural
2. Which of the following antimicrobial drugs is synthetic?
 - A. sulfanilamide
 - B. penicillin

- C. actinomycin
 - D. neomycin
3. Which of the following combinations would most likely contribute to the development of a superinfection?
- A. long-term use of narrow-spectrum antimicrobials
 - B. long-term use of broad-spectrum antimicrobials
 - C. short-term use of narrow-spectrum antimicrobials
 - D. short-term use of broad-spectrum antimicrobials
4. Which of the following routes of administration would be appropriate and convenient for home administration of an antimicrobial to treat a systemic infection?
- A. oral
 - B. intravenous
 - C. topical
 - D. parenteral
5. Which clinical situation would be appropriate for treatment with a narrow-spectrum antimicrobial drug?
- A. treatment of a polymicrobial mixed infection in the intestine
 - B. prophylaxis against infection after a surgical procedure
 - C. treatment of strep throat caused by culture identified *Streptococcus pyogenes*
 - D. empiric therapy of pneumonia while waiting for culture results
6. Which of the following terms refers to the ability of an antimicrobial drug to harm the target microbe without harming the host?
- A. mode of action
 - B. therapeutic level
 - C. spectrum of activity
 - D. selective toxicity
7. Which of the following is not a type of β -lactam antimicrobial?
- A. penicillins
 - B. glycopeptides
 - C. cephalosporins
 - D. monobactams

8. Which of the following does not bind to the 50S ribosomal subunit?
- A. tetracyclines
 - B. lincosamides
 - C. macrolides
 - D. chloramphenicol
9. Which of the following antimicrobials inhibits the activity of DNA gyrase?
- A. polymyxin B
 - B. clindamycin
 - C. nalidixic acid
 - D. rifampin
10. Which of the following is not an appropriate target for antifungal drugs?
- A. ergosterol
 - B. chitin
 - C. cholesterol
 - D. $\beta(1\rightarrow3)$ glucan
11. Which of the following drug classes specifically inhibits neuronal transmission in helminths?
- A. quinolines
 - B. avermectins
 - C. amantadines
 - D. imidazoles
12. Which of the following is a nucleoside analog commonly used as a reverse transcriptase inhibitor in the treatment of HIV?
- A. acyclovir
 - B. ribavirin
 - C. adenine-arabinoside
 - D. azidothymidine
13. The following is an antimalarial drug that is thought to increase ROS levels in target cells?
- A. artemisinin
 - B. amphotericin B
 - C. praziquantel

- D. pleconaril
14. Which of the following resistance mechanisms describes the function of β -lactamase?
- A. efflux pump
 - B. target mimicry
 - C. drug inactivation
 - D. target overproduction
15. Which of the following resistance mechanisms is commonly effective against a wide range of antimicrobials in multiple classes?
- A. efflux pump
 - B. target mimicry
 - C. target modification
 - D. target overproduction
16. Which of the following resistance mechanisms is the most nonspecific to a particular class of antimicrobials?
- A. drug modification
 - B. target mimicry
 - C. target modification
 - D. efflux pump
17. Which of the following types of drug-resistant bacteria do not typically persist in individuals as a member of their intestinal microbiota?
- A. MRSA
 - B. VRE
 - C. CRE
 - D. ESBL-producing bacteria
18. In the Kirby-Bauer disk diffusion test, the _____ of the zone of inhibition is measured and used for interpretation.
- A. diameter
 - B. microbial population
 - C. circumference
 - D. depth

19. Which of the following techniques cannot be used to determine the minimum inhibitory concentration of an antimicrobial drug against a particular microbe?
- A. E-test
 - B. microbroth dilution test
 - C. Kirby-Bauer disk diffusion test
 - D. macrobroth dilution test
20. The utility of an antibiogram is that it shows antimicrobial susceptibility trends_____.
- A. over a large geographic area.
 - B. for an individual patient.
 - C. in research laboratory strains.
 - D. in a localized population.

SECTION B - ANSWER ALL QUESTIONS

- 1. Write short notes on antibiotic producing microorganisms. (5 Marks)
- 2. Describe the perfect antibiotic. (5 Marks)
- 3. Using examples, highlight spectrums of antibacterial activity. (5 Marks)
- 4. Enumerate advantages and disadvantages of bacteriophage therapies. (5 Marks)
- 5. Describe probiotics. (5 Marks)
- 6. Describe topical antifungal agents. (5 Marks)
- 7. Outline the role of health care workers in development of AMR. (5 Marks)
- 8. Summarise the roles of antimicrobial stewardship teams in a health facility. (5 Marks)

SECTION C - ANSWER TWO QUESTIONS

- 1. Discuss inactivation of drugs by enzymes. (20 Marks)
- 2. Using examples, discuss antibacterial agents that are inhibitors of bacterial cell wall synthesis. (20 Marks)
- 3. Discuss antiviral agents. (20 Marks)