College of Science كلية العلوم

Department of Botany & Microbiology قسم النبات والاحياء الدقيقة

Final Exam
Academic Year 1447 Hijri- SecondSemester

Exam Information معلومات الامتحان			
Course Name	Antibiotics	مضادات حيوية	اسم المقرر
Course Code	463 MBIO	463 حدق	رمز المقرر
Exam Date	2026-06-04	1447-12-18	تاريخ الامتحان
Exam Time	01 00 PM		وقت الامتحان
Exam Duration	2 hours	ساعتان	مدة الامتحان
Classroom No.	1 B25 B. 5	١ب ٢٥ م ٥	رقم قاعة الاختبار
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Student Information معلومات الطالب		
Student's Name		اسم الطالب
ID number		الرقم الجامعي
Section No.	911	رقم الشعبة
Serial Number		الرقم التسلسلي

General Instructions:

- Your Exam consists of 3 PAGES (Except this page). صفحات الامتحان ٣ صفحة. (باستثناء هذه الورقة).
- Keep your mobile and smart watch out of the classroom. يجب إبقاء الهواتف والساعات الذكية خارج قاعة الامتحان.

هذا الجزء خاص بأستاذ المادة

This section is ONLY for instructor

#	Course Learning Outcomes (CLOs)	Related Question (s)	Points	Points earned	Final	Actual Point
1	**CLO 1:** Initial concepts of antibiotics	**Q2** (1,3,7,8,10) **Q3** (1,4,6,8) **Q4** (4,6,8,9,17)	14X0.5	7		
2	**CLO 2:** Comprehension of extracting and measuring the rate of reaction of antibiotics and antibiotic biosynthesis	**Q2** (5,6,11) **Q3** (2,5,13) **Q4** (5,7,15,18,19)	11X0.5	5.5		
3	**CLO 3:** How to use antibiotic treatment and methods of use in the prevention	**Q1** (2) **Q2** (2,9,12,13,14,15) **Q3** (10) **Q4** (2,10,13,16)	1X2 11X0.5	7.5		
4	**CLO 4:** Learn how to detect the activity of antibiotics	**Q3** (3,11,12,14,15) Q4 (1)	6X0.5	3		
5	**CLO 5:** Discuss where antibiotics come from.	**Q2** (4) **Q3** (16) **Q4** (12,14,20)	5X0.5	2.5		
6	**CLO 6:** Discuss the causes of the development of antibiotic resistance	**Q1** (1,3,4) **Q2** (16,17,18,19,20) **Q3** (9,17,18,19,20)	3X2 10X0.5	11		
7	**CLO 7:** How to use antibiotics in the treatment and side effects.	**Q1** (5) **Q3** (7) **Q4** (3,11)	1X2 3X0.5	3.5		
					40	

EXAM COVER BAGE

***Q1*: Mention and discuss as required: (Answer ONLY 5 of the following questions). (10 Marks)**

1) What are the functions of plasmids in bacteria?

2) Describe the key considerations a physician must evaluate before prescribing antibiotics?

3) What are the critical priority bacteria in the WHO 2024 list?

4) What does the term plasmid incompatibility mean?

5) What are the common types of gastrointestinal (GI) upset?

6) What is an example of metabolic pathway alteration in antibiotic resistance?

***Q2*: Select the correct answer for the following multiple-choice questions. (10 Marks)**			
1. It kills bacteria by preventing essential organelles from functioning or proteins from performing their functions.			
A. Bacteriostatic	**B.** Bacteriolytic	**C.** Bacteriocidal	**D.** Bacteriophage
2. Precursors bind to a lipid carrier and are transported to the outer membrane surface during ….. of cell wall synthesis.			
A. the first stage	**B.** the second stage	**C.** the third stage	**D.** the final stage
3. Which characteristic describe high-quality antibiotics?			
A. Chemically unstable	**B.** Expensively produced	**C.** Highly toxic to host	**D.** No side effects
4. Which of the following antibiotics is derived from Actinomycetes?			
A. Polymyxin	**B.** Cephalosporin	**C.** Streptomycin	**D.** Penicillin
5. Which of the following is a technological method to measure antibiotic activity?			
A. Disc test	**B.** Vitek 2	**C.** E-test	**D.** Broth serial dilution
6. One standard method for determining the effect of antibiotic activity is based on measuring the light extraction.			
A. Enzyme Activity	**B.** Impedance Analysis	**C.** Nephelometry	**D.** Turbidimetry
7. What is one reason antibiotic synergy is desirable?			
A. Narrow the spectrum effect	**B.** Preventing the evolutionary selection of resistant strains.	**C.** Extending the course of therapy.	**D.** Leads to a higher dosage.
8. What is an example of an antibiotic combination that produces synergism?			
A. Ampicillin and cephalexin	**B.** Ampicillin and gentamicin	**C.** Quinolone and tetracycline	**D.** Penicillin and streptomycin
9. When are antibiotics used therapeutic?			
A. To treat confirmed infections	**B.** To prevent infection before exposure	**C.** To decrease side effects	**D.** As long-term therapy
10. The effect of the antibiotics group (less<) effect of a more active antibiotic in the same group.			
A. Indifference	**B.** Addition	**C.** Antagonism	**D.** Synergism
11. What is the next step after growth control in the main steps in antibiotic production?			
A. Fermentation process	**B.** Harvesting	**C.** Crystallization	**D.** Extraction
12. Which bacterial structure do polymyxins target?			
A. Outer membrane	**B.** Ribosomes	**C.** Peptidoglycan	**D.** Folate
13. Which class of antibiotics inhibits DNA gyrase and topoisomerase IV?			
A. Polymyxins	**B.** Quinolones	**C.** Macrolides	**D.** Sulfonamides
14. Clindamycin inhibits protein synthesis by binding to which ribosomal subunit?			
A. 30S	**B.** 40S	**C.** 50S	**D.** 60S
15. Which enzyme inserts negative supercoils into DNA and releases positive supercoils?			
A. Topoisomerase IV	**B.** RNA polymerase	**C.** Helicase	**D.** DNA gyrase
16. Long-term exposure of bacteria to antibiotics mainly leads to:			
A. Development of antibiotic resistance	**B.** Increased bacterial size	**C.** Loss of virulence	**D.** Complete eradication of bacteria
17. A fragment of DNA is transferred from one bacterium to another by bacteriophages.			
A. Transformation	**B.** Transduction	**C.** Conjugation	**D.** Mutation
18. A conjugative plasmid is characterized by:			
A. Presence of *tra* genes that promote conjugation	**B.** Inability to initiate conjugation	**C.** Absence of transfer *tra* genes	**D.** Lack of any functional genes
19. The WHO 2024 medium priority group includes:			
A. *Shigella* spp. (fluoroquinolone resistant)	**B.** *Neisseria gonorrhoeae* (fluoroquinolone resistant)	**C.** *Acinetobacter baumannii* (carbapenem resistant)	**D.** *Haemophilus influenzae* (ampicillin resistant)
20. A plasmid containing a gene that allows the digestion of unusual substances (metabolic enzymes).			
A. Cryptic plasmid	**B.** Degradative plasmid	**C.** F plasmid	**D.** R plasmid

The answer to the multiple-choice question is placed in this table.									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

***Q3*: Put a check (√) mark if the statement is correct and an (×) mark if incorrect.**		**(10 Marks)**
1	Differences between bacterial and human ribosomes explain selective antibiotic toxicity.	
2	Physicochemical Test: Measure the potency and activity of an antibiotic based on its effect on microbes.	
3	*In vivo,* a scientific experiment performed outside a living organism (test tubes/petri dishes).	
4	Selective toxicity means an antibiotic affects both the microorganism and the host cells equally.	
5	MIC and MBC tests are used to measure antibiotic effectiveness in vitro.	
6	Antimicrobial agents refer only to substances produced by microorganisms.	
7	Angioedema is swelling of lips, eyelids, or face, which can lead to dangerous airway obstruction.	
8	Antibiotic synergy allows treatment of serious infections before identifying the microbe.	
9	Plasmids replicate non-independently of chromosomal DNA.	
10	Dysentery can be caused only by bacteria.	
11	Phosphonic acid inhibits MurA enzyme, blocks the first stage of peptidoglycan synthesis.	
12	Rifampicin inhibits both DNA gyrase and topoisomerase IV.	
13	Crystallization or precipitation: The pure antibiotic is made into crystals or a solid form to get a clean product.	
14	Tetracyclines bind to the 30S ribosomal subunit, causing misreading of mRNA.	
15	Sulfonamides inhibit dihydrofolate synthase.	
16	The problem of classification is based on the mechanism of action; some antibiotics act through multiple mechanisms.	
17	Horizontal gene transfer plays a role in the spread of antibiotic resistance.	
18	Overuse and misuse of antibiotics in humans and animals contribute to the rise of antibiotic resistance.	
19	Cryptic plasmids carry genes that provide resistance to antibiotics and poisons.	
20	Mutation, transformation**,** transduction, and conjugation are all forms of horizontal gene transfer.	

***Q4*: Match the following two columns to form a correct relationship** **(10 marks)**

A.	**Monobactams**
B.	**Replacement therapy**
C.	**Macrolides**
D.	**Actinomycin**
E.	***Penicillium notatum***
F.	**Antigen**
G.	**Synthetic antibiotic**
H.	**MIC**
I.	**PCR**
J.	**Fungistatic agent**
K.	**Antiseptic**
L.	**Selective toxicity**
M.	**Dysentery**
N.	**Streptomyces**
O.	**Nephelometry**
P.	**Semi-synthetic antibiotic**
Q.	**HS-GC**
R.	**Impedance analysis**
S.	**Angioedema**
T.	**Antiserum**
U.	**Streptogramins**
V.	**Anaphylaxis**
W.	**Polypeptide**
X.	**Antibody**
Y.	**BD Phoenix**
Z.	**Bactericidal agent**

	1. Monitors electrical resistance changes in bacteria.
	2. A disease that affects the colon and causes severe diarrhea.
	3. Substance secreted by soil Actinomycetes used externally due to toxicity.
	4. Type of therapy involving beneficial microbes to replace pathogens.
	5. Mold that produces the first discovered antibiotic.
	6. A chemical that kills bacteria.
	7. An agent that inhibits the growth of fungi.
	8. A protein that recognizes foreign invaders.
	9. Serum containing antibodies against a specific antigen.
	10. The lowest antibiotic concentration inhibiting bacterial growth.
	11. Low blood pressure, bronchospasm, and airway damage.
	12. Derived from chemical modification of natural compounds.
	13. Bind the 50S subunit, synergistically inhibiting protein synthesis.
	14. Common soil bacteria are a source of antibiotics.
	15. Automated susceptibility testing system.
	16. Inhibits cell wall synthesis in the second stage.
	17. Amplifies specific resistance genes.
	18. Monitors CO_2 production to assess bacterial growth.
	19. Inhibit PBPs, block cell wall synthesis, final stage.
	20. Fully manufactured by chemical synthesis.

With best wishes
Dr. Naiyf S. Alharbi