College of Science كلية العلوم

Department of Botany & Microbiology قسم النبات والاحياء الدقيقة

Final Exam
Academic Year 1447 Hijri- First Semester

Exam Information معلومات الامتحان			
Course Name	Antibiotics	مضادات حيوية	اسم المقرر
Course Code	463 MBIO	463 حدق	رمز المقرر
Exam Date	2025-12-28	1447-07-08	تاريخ الامتحان
Exam Time	01 00 PM		وقت الامتحان
Exam Duration	2 hours	ساعتان	مدة الامتحان
Classroom No.	1 B9 B. 5	١ب ٩ م ٥	رقم قاعة الاختبار
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Student Information معلومات الطالب		
Student's Name		اسم الطالب
ID number		الرقم الجامعي
Section No.	4569	رقم الشعبة
Serial Number		الرقم التسلسلي

General Instructions:

- Your Exam consists of 4 PAGES (Except this page). صفحات الامتحان 4 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	Q1 (2) Q2(20,23) Q3(2,3,4,5,6.8,11,16,21,24,29)	8.5			
2	**CLO 2:** Comprehension of extracting and measuring the rate of reaction of antibiotics and antibiotic biosynthesis	Q2 (2,7,10,11) Q3 (1,7,9,12,13)	4.5			
3	**CLO 3:** How to use antibiotic treatment and methods of use in the prevention	Q1(3) Q2(2,7,17,18,19,21,22) Q3(10)	6			
4	**CLO 4:** Learn how to detect the activity of antibiotics	Q1 (1) Q2 (6,12,13)	3.5			
5	**CLO 5:** Discuss where antibiotics come from.	Q1 (5) Q2 (3,14) Q3 (30)	3.5			
6	**CLO 6:** Discuss the causes of the development of antibiotic resistance	Q1 (4) Q2(24,25,26,27,28,29,30) Q3 (22,23,25,26,27,28)	8.5			
7	**CLO 7:** How to use antibiotics in the treatment and side effects.	Q2 (1,5,7,15,16) Q3 (14,15,17,18,19,20)	5.5			

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EXAM COVER BAGE

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

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

2) What is the function of RNA polymerase?

3) List four principal mechanisms by which bacteria resist the action of antibiotics.

4) Classify plasmids based on their ability to transfer and give one example of each type.

5) What are the sources of antibiotics according to the organism, with an example of each source?

6) List five of the principal tests for secondary antibiotic screening, with the definition of two of them?

***Q2*: Select the correct answer for the following multiple-choice questions. (15 Marks)**			
1. Destroying the cell wall/membrane by inserting chemical porous plugs, causing the cell to leak.			
A. Bacteriostatic	**B.** Bacteriocidal	**C.** Bacteriolytic	**D.** Bacteriophage
2. What symptoms may appear with dysentery?			
A. Skin rash	**B.** Blood and mucus in stool	**C.** Chest pain	**D.** Insomnia
3. Which characteristic does NOT describe high-quality antibiotics?			
A. Chemically stable	**B.** Easily and inexpensively produced	**C.** Highly toxic to host	**D.** Broad spectrum of activity
4. Which of the following antibiotics is derived from fungi?			
A. Polymyxin	**B.** Sulfonamide	**C.** Streptomycin	**D.** Penicillin
5. Which of the following is NOT a microbiological method to measure antibiotic activity?			
A. Disc test	**B.** E-test	**C.** Phoenix system	**D.** Broth serial dilution
6. One standard method for determining the effect of antibiotic activity is based on measuring the light scattered.			
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.** Allow the evolutionary selection of resistant strains.	**C.** Extending the course of therapy.	**D.** Leads to lower dosage.
8. What is an example of an antibiotic combination that produces indifference?			
A. Ampicillin and cephalexin	**B.** Ampicillin and gentamicin	**C.** Quinolone and tetracycline	**D.** Penicillin and streptomycin
9. When are antibiotics used prophylactically?			
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 inoculation in the main steps in antibiotic production?			
A. Growth control	**B.** Fermentation process	**C.** Harvesting	**D.** Crystallization
12. CLSI guidelines help determine:			
A. Quality of medium	**B.** Color of colonies	**C.** Susceptibility of bacteria	**D.** Packaging material
13. Secondary antibiotic screening evaluates:			
A. Nutrient composition only	**B.** Antimicrobial activity and yield	**C.** Packaging design	**D.** Final user feedback
14. Which step ensures a pure, solid antibiotic product?			
A. Inoculation	**B.** Enzyme assay	**C.** Crystallization or precipitation	**D.** First sample collection
15. What type of chemical modification helped solve the instability of penicillins in acidic environments?			
A. Use of bacteriostatic agents	**B.** Semi-synthetic derivatization	**C.** Temperature control	**D.** Color change reactions

16. What is a common hypersensitivity reaction to penicillin therapy?			
A. Hypertension	**B.** Anaphylaxis	**C.** Liver toxicity	**D.** Vomiting
17. Which bacterial structure do polymyxins target?			
A. Outer membrane	**B.** Ribosomes	**C.** Peptidoglycan	**D.** Folate
18. Which class of antibiotics binds to D-Ala-D-Ala in cell wall synthesis?			
A. Polypeptides	**B.** Beta-lactamase inhibitors	**C.** Glycopeptides	**D.** Carbapenems
19. Which class of antibiotics inhibits DNA gyrase and topoisomerase IV?			
A. Polymyxins	**B.** Quinolones	**C.** Macrolides	**D.** Sulfonamides
20. What is the key element added to quinolones to form fluoroquinolones?			
A. Fluorine atom	**B.** Chlorine atom	**C.** Bromine atom	**D.** Iodine atom
21. Clindamycin inhibits protein synthesis by binding to which ribosomal subunit?			
A. 30S	**B.** 40S	**C.** 50S	**D.** 60S
22. Which antibiotic group inhibits RNA polymerase, thus preventing mRNA synthesis?			
A. Quinolones	**B.** Metronidazoles	**C.** Rifampicins	**D.** Nitrofurans
23. Which enzyme inserts negative supercoils into DNA and releases positive supercoils?			
A. Topoisomerase IV	**B.** RNA polymerase	**C.** Helicase	**D.** DNA gyrase
24. Long-term exposure of bacteria to antibiotics mainly leads to:			
A. Increased bacterial size	**B.** Development of antibiotic resistance	**C.** Loss of virulence	**D.** Complete eradication of bacteria
25. Direct cell-to-cell contact with a mating bridge is characteristic of:			
A. Transformation	**B.** Transduction	**C.** Conjugation	**D.** Mutation
26. 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
27. The WHO 2024 critical priority group includes:			
A. Group A Streptococci (macrolide resistant)	**B.** *Neisseria gonorrhoeae* (fluoroquinolone resistant)	**C.** *Acinetobacter baumannii* (carbapenem resistant)	**D.** *Haemophilus influenzae* (ampicillin resistant)
28. 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)
29. A plasmid containing genes that turn the bacterium into a pathogen is called:			
A. Cryptic plasmid	**B.** Virulence plasmid	**C.** F plasmid	**D.** R plasmid
30. A plasmid containing genes that provide resistance against antibiotics and poisons is called:			
A. Cryptic plasmid	**B.** Virulence 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**
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**

***Q3*: Put a check (√) mark if the statement is correct and an (×) mark if incorrect.**		**(15 Marks)**
1	Antimicrobial agents refer only to substances produced by microorganisms.	
2	Dysentery can be caused by both bacteria and parasites.	
3	Antibody is a protein produced by the body's immune system to neutralize foreign invaders like bacteria or viruses.	
4	Minimum Inhibitory Concentration (MIC) is the lowest concentration that kills bacteria.	
5	Selective toxicity means an antibiotic affects both the microorganism and the host cells equally.	
6	MIC and MBC tests are used to measure antibiotic effectiveness in vitro.	
7	Automated systems like VITEK and BD Phoenix can rapidly determine antimicrobial susceptibility.	
8	PCR is used to inhibit bacterial growth directly.	
9	HS-GC: Monitors changes in the electrical resistance of a bacterial sample when exposed to an antibiotic.	
10	Antibiotic synergy allows treatment of serious infections before identifying the microbe.	
11	Plasmids replicate non-independently of chromosomal DNA.	
12	Extraction and purification of antibiotics are carried out after fermentation.	
13	The final product of antibiotic production can be in powder or tablet form.	
14	Carbapenems are inhibits MurA enzyme, blocks first stage of peptidoglycan synthesis.	
15	Itching is swelling of lips, eyelids, or face, which can lead to dangerous airway obstruction.	
16	Plasmid size ranges from 10 kb to more than 2000 kb.	
17	Fluoroquinolones inhibit both DNA gyrase and topoisomerase IV.	
18	Tetracyclines bind to the 30S ribosomal subunit, causing misreading of mRNA.	
19	Aminoglycosides act by blocking tRNA attachment to the ribosome.	
20	Sulfonamides inhibit dihydrofolate reductase.	
21	Differences between bacterial and human ribosomes explain selective antibiotic toxicity.	
22	Horizontal gene transfer plays no role in the spread of antibiotic resistance.	
23	Mutation, transformation**,** transduction, and conjugation are all forms of horizontal gene transfer.	
24	Several different plasmids can coexist in a single bacterial cell.	
25	Col-plasmids carry genes that provide resistance to antibiotics and poisons.	
26	Overuse and misuse of antibiotics in humans and animals contribute to the rise of antibiotic resistance.	
27	Poor hygiene and weak infection prevention measures have no impact on the spread of resistant bacteria.	
28	Using bacteriophages to selectively target and kill resistant strains helps to combat antibiotic-resistant bacteria.	
29	The term plasmid was first introduced by the molecular biologist Joshua Lederberg.	
30	The problem of classification based on microbial source is due to the overlap between natural, semi-synthetic, and synthetic antibiotics.	

With best wishes
Dr. Naiyf S. Alharbi