A) True B) False

22. Streptomycin was the first effective antibiotic against TB.

A) True B) False

23. *Nocardiopsis*, an endophytic actinobacterium associated with mandarin recorded highest IAA production.

A) True B) False

Part 2: choose correct answer in the following sentences: -(21 marks)

1. compounds have been identified as products of *Streptomyces* secondary metabolism.

a-Antibacterial b-antifungal c-antiparasitic d- All of them

2. Vegetative hyphae of Frankia alni are .....in diameter

a-1-2.5 µm b- 0.5-2.0 µm c- 5-10 µm d- 2-5 µm

3. Streptomycetes make ..... of soil bacteria.

a- 10% b- 20% c- 40% d- 50%

4. Rhizospheric actinomycetes influence plant growth directly by .....

4. N2 fixation b- phosphate solubilization c- siderophores d- all of them

5. Under ..... *Streptomyces* sp. are the numerous microbial population in soil.

a- dry condition b- alkaline condition c- moisture condition d- dry and alkaline conditions

6. Streptomyces are:

a- All strict anaerobes b- Predominantly found in soil

c- Cell wall type III d- 1.5-5.0 pm in diameter

7. *Frankia* is responsible for ..... of the biologically fixed nitrogen in the world

a-15% b- 20% c- 30% d- 40%

8. The first chemical synthesized antibiotic was

a- Kanamycin b- Chloramphenicol c- Tetracycline d- Streptomycin

A) True B) False

11. ***Streptomycetes*** **need vitamins and growth factors.**

A) True B) False

12. ***Frankia*** **infects the root cells of actinorhizal plants through either intracellular root-hair infection or intercellular root invasion.**

A) True B) False

13. **Two species of Streptomyces by the name of *Streptomyces* griseus and Streptomyces coelicolor are used for industrial production of Streptomycin and novel antibiotics such as dihydrogranticin**

A) True B) False

14. **Siderophores are high molecular weight high affinity iron chelators.**

A) True B) False

15. **Doxorubicin as anticancer agents and Rapamycin as immunomodulatory agents are Secondary metabolites produced by *Streptomycetes*.**

A) True B) False

16. **Streptomyces spp. produce about 80% of natural antibiotics.**

A) True B) False

17. **All Streptomyces sp. are mesophile**

A) True B) False

18. ***Streptomyces*** **is including hydroxamate siderophores: desferrioxamines and coelichelin.**

A) True B) False

19. **Streptomycetes are not resistant to drought and form arthrospore.**

A) True B) False

20. **Tetracyclines bind to the 30s subunit of microbial ribosomes. They inhibit protein synthesis by blocking the attachment of charged aminoacyl-tRNA to the B site on the ribosome.**

A) True B) False

21. **Frankia strains have been known to secrete extracellular cellulases, pectinases, and proteinases.**

Assiut University-Faculty of Science- Botany and microbiology department

First semester (2024/2025)-Final exam of Actinomycetes (472 B)

Bachelor's degree (Fourth level) Date: 27/5/2025

Time: 2 hour degree: /50

Answer the following question

Part 1: choose (True) or (False) in the following sentences: - (23 marks)

1. Actinobacteria is one of the dominant bacterial phyla and contains one of the largest of bacterial genera, *Streptomyces.*

   A) True B) False

2. *Frankia*, fixes N in legumes under both symbiotic and free-living conditions.

   A) True B) False

3. Many *Streptomyces* species are known to be pathogens, in plants, such as mycetoma, can be caused by *S. somaliensis* and *S. sudanensis*

   A) True B) False

4. *In Frankia*, Hopanoids themselves play a more specific and molecular role in the oxygen protection mechanism of nitrogenase.

   A) True B) False

5. Streptomycetes are capable to produce degrade cellulose, lignocellulose, chitin and different organic compounds in biogeochemical cycles.

   A) True B) False

6. Reproductive hyphae called spore-bearing mycelium.

   A) True B) False

7. Marine invertebrates, particularly sponges, are of excessive interest for discovering novel Streptomecetes.

   A) True B) False

8. The diazo-vesicles are responsible for the supplying of sufficient phosphate to the host plant during symbiosis.

   A) True B) False

9. *Streptomyces* act as biological control of sun flower stem rot and potato common scab

   A) True B) False

10. All Streptomyces spp. are anaerobes.

2. How do microorganisms play a crucial role in biofuel production by both facilitating and hindering the process of anaerobic digestion, particularly in relation to the metabolic pathways of methane formation?

Good Luck

Prof Dr Mohamed Hemida Abd-Alla

Q 6. The conversion of biomass waste into energy is presented as a solution to economic, environmental, and energy security challenges. In light of this statement, discuss the following:

1. What are the types of biofuel generation, and what are their advantages and disadvantages?

2. Write an account of the metabolic pathways involved in lactic acid synthesis and the extraction process for industrial production.

Q5.1. Write a detailed account of the industrial production of acetic acid through two sequential stages and their metabolic pathways.

3. **Metabolic pathway for Streptomycin synthesis**

Q 5. Discuss each of the following

1. Downstream processing for Penicillin production

2. Metabolic pathways for Penicillin synthesis

3. **Biotechnological approaches to improving biofertilizer efficacy**

4. **Molecular signals in *Rhizobium*-legume symbiosis and structure and function of nodule components**

Q3. Describe each of the following:

1. **Types of biofertilizers, their functions, and methods of application**

2. **Characteristics and types of carriers used in biofertilizers production**

3. **Perfusion Batch Culture with labeled diagram and their application**

4. **Fed-Batch Fermentation with labeled diagram and their application**

Q2. Write an account in Each of the Following:

1. **Properties of microbes involved in antibiotic production**

2. **The mechanism of action of polymyxin with labeled diagram**

Assiut University
Faculty of Science
Botany & Microbiology Department
Biotechnology program
Second Semester- Final Examination

Date: May 26, 2025
The time allowed: 2 hours
Total mark: /50
Subject: Industrial Biotech: BT402

General Instructions: - Answer only five of the following questions in the examination book provided.

Q1. Place a tick √ in the correct answer (10 Marks).

1. **Aminoglycosides antibiotics act by**
A) Wall-synthesis B) RNA-block C) Ribosomal-30S D) DNA-gyrase

2. **What factor is NOT typically optimized during the fermentation process?**
A) pH B) Temperature C) Light D) Nutrients

3. **A glycopeptide antibiotic primarily acts by inhibiting:**
A) DNA replication B) Wall- synthesis C) RNA transcription D) Protein synthesis

4. **Which biofertilizer is recommended for waterlogged soils?**
A) *Nostoc* B) *Rhizobium* C) *Azotobacter* D) *Sinorhizobium*

5. **Which organic acid is essential in the making of Swiss cheese?**
A) Citric acid B) Lactic acid C) Acetic acid D) Propionic acid

6. **How does Congo red identify *Rhizobium*?**
A) Absorbs-red B) Changes-pH C) Excludes-red D) Kills-bacteria

7. **Which organic acid is used in the production of biodegradable plastics?**
A) Citric acid B) Lactic acid C) Acetic acid D) Butyric acid

8. **Which organic acid is used in the production of effervescent tablets?**
A) Citric acid B) Lactic acid C) Acetic acid D) Butyric acid

9. **What combines with acetyl-CoA to form citric acid?**
A) Pyruvate B) Oxaloacetate C) Lactate D) Ethanol

10. **The specificity of legume-Rhizobium is due to**
A) Ammonia B) Ureides C) Amides D) Flavonoids

21- Which of the following bacteria is health beneficial in the human colon?

a- *Lactobacillus*
b- *Salmonella*
c- *Shigella*

22- Botulinum toxin is a neurotoxin produced by *Clostridium botulinum* under ……,…….. and is responsible for botulism, a notifiable, bacterial form of food poisoning.

a- anaerobic conditions
b- aerobic conditions
c- both aerobic and anaerobic conditions

23- Any change which makes food unfit for human consumption is called ……..

a- processing
b- spoilage
c- preservation

24- The botulinum toxin has been found in a variety of foods, including ……..

a- canned food
b- sausage
c- All of the above

25- What bacteria cannot be killed by cooking?

a- *Bacillus*
b- *Clostridium*
c- All of the above

8- **Spoilage of food maintained at refrigeration temperatures occurs by ..... with the ability to multiply at low temperature.**

a- psychrophilic microbes
b- halophilic microbes
c- microaerophilic microbes

9- **Which of the following statements are true about *Staphylococcus* toxins?**

a- Heat-stable enterotoxins produced by *Staphylococcus aureus*
b- food poisoning where symptoms have a rapid onset and include nausea, vomiting and abdominal cramping
c- All of the above

10- **Which of the following food preservation methods relies on reducing water activity to inhibit microbial growth?**

a- Canning
b- Freezing
c- Desiccation

11- **What is the primary role of pasteurization in food processing?**

a- Eliminate all microbes
b- Reduce the microbial load without affecting the quality of food significantly
c- Preservation of color

12- **..... is an organic compound used as a food preservative.**

a- Sorbic acid
b- Fructose
c- Dextrose

13- **In food microbiology, what does HACCP stand for?**

a- Hazard Analysis and Critical Control Points
b- High Altitude Cooking and Cooling Process
c- Harmful Additives Control and Cleaning Protocol

14- Which of the following is a foodborne pathogen associated with undercooked poultry?

a- *Acetobacter aceti*
b- *Streptococcus thermophilus*
c- *Campylobacter jejuni*

15- Acetic acid can be used for .....

a- preservation of color
b- preservation of pickles
c- None of the above

16- What is the main function of nitrites in cured meats?

a- preservation of color
b- food preservatives that suppress the growth of bacteria, *Clostridium botulinum* in particular where it prevents the germination of *Clostridium* endospores.
c- None of the above

17- Which of the following is a foodborne pathogen that causes bloody diarrhea?

a- *Lactobacillus acidophilus*
b- *Escherichia coli* O157: H7
c- *Lactococcus lactis*

18- Gamma radiation is used in food industry for .....

a- food cooking
b- food preservation where it penetrates the food, rapidly killing food-poisoning bacteria, harmful parasites, and insects
c- improving texture

19- Salting is a fundamental method of food preservation where it kills microbes by the process of ..... due to high osmotic pressure.

a- plasmolysis
b- turgidity
c- None of the above

20- At ..... pH most food spoilage bacteria grow.

a- acidic
b- neutral
c- strong alkaline

8- **Spoilage of food maintained at refrigeration temperatures occurs by ..... with the ability to multiply at low temperature.**

a- psychrophilic microbes
b- halophilic microbes
c- microaerophilic microbes

9- **Which of the following statements are true about *Staphylococcus* toxins?**

a- Heat-stable enterotoxins produced by *Staphylococcus aureus*
b- food poisoning where symptoms have a rapid onset and include nausea, vomiting and abdominal cramping
c- All of the above

10- **Which of the following food preservation methods relies on reducing water activity to inhibit microbial growth?**

a- Canning
b- Freezing
c- Desiccation

11- **What is the primary role of pasteurization in food processing?**

a- Eliminate all microbes
b- Reduce the microbial load without affecting the quality of food significantly
c- Preservation of color

12- **..... is an organic compound used as a food preservative.**

a- Sorbic acid
b- Fructose
c- Dextrose

13- **In food microbiology, what does HACCP stand for?**

a- Hazard Analysis and Critical Control Points
b- High Altitude Cooking and Cooling Process
c- Harmful Additives Control and Cleaning Protocol

...ut University
Faculty of Science
Department of Botany and Microbiology

Food Microbiology (B498)
S2-2024/2025
Final Exam, 50 marks

[Part A]: Choose the Correct Answer for the following questions. (25 points)
(Each question worth one mark)

1- **Which of the following bacteria does not cause food poisoning?**

a- *Staphylococcus aureus*
b- *Acetobacter aceti*
c- *Bacillus cereus*

2- **Microorganisms are used in production of which of the following?**

a- Alcoholic beverages and Breads
b- Fermented dairy products
c- All of the above

3- **Pasteurization of milk, widely practiced in several countries, requires temperatures of about .....°C maintained for 30 minutes.**

a- 40
b- 63
c- 37

4- **The presence of which of the following bacteria is tested in canned foods for evaluating the efficiency of sterilization of these food products?**

a- *Lactobacillus*
b- *Clostridium botulinum*
c- *Streptococcus thermophilus*

5- **Jellies and jams are rarely affected by bacterial action because of high sugar content.**

a- True
b- False

6- **What is the primary purpose of adding chemical preservatives to food?**

a- Improving texture and enhancing flavor
b- Increasing nutritional value
c- Inhibiting microbial growth

7- **Some food naturally contains antimicrobial substances that inhibit microbial attack. Egg white has ..... which destroy susceptible bacteria.**

a- Lysozyme
b- Lactenin
c- None of the above

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

8-Abscisic Acid (ABA) Accumulation?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

With my best wishes

Prof. Dr. Hanaa Kamal Galal

.....

.....

.....

.....

6- Shoot Adaptation (Write 3)?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

7- Different Photosynthetic Pathways (C4 Syndrome CAM Plants C_3 plants)?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

3-What are the main mechanisms that halophytes use to adapt to high salinity?

.....

.....

.....

.....

.....

.....

.....

.....

4- What is the commercial and agricultural importance of halophytes, refers to the main environmental factors affecting halophytes?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

5- The difference between Avoidant Plants (arido-active) and Tolerant Plants (arido-tolerant)?

.....

.....

.....

.....

.....

.....

.....

	Latex Tubes	8	The presence of storage tissues and mucilaginous substances are characteristic to many fleshy xerophytes.
	Geophytes	9	Xerophytes that possess abundant hair on their leaves and stems are commonly calle……xerophytes.
	Drought-Resistant Xerophytes	10	…… Found in many xerophytic stems and leaves the laticiferous canals are present (e.g. *Calotropis, Euphorbia,* some members of Asteraceae).

Q3- Write on:

1- Functions of hairs?

……
……
……
……
……
……
……
……

2- Root Adaptation?

……
……
……
……
……
……
……
……
……
……

9- To cope with strong sunlight, halophytes may:

a- Shed all leaves b- Grow only at night c- Reduce leaf area

10- Light intensity is especially impactful on halophytes that grow in:

a- Open coastal or arid environments b- Cold mountainous areas c- Urban gardens

Q2- Please combines the two columns:

	Drought-Deciduous xerophytes	1	…….. Annuals or short- lived vascular plants that germinate after fairly heavy rainfall to leach out the inhibitors and to support growth. These species rapidly complete their cycles of development in a few weeks.
	Tolerant Plants (arido-tolerant)	2	…….. have underground organs full of water (rhizome, tuber, bulb and corn) that can survive periods of drought, being protected from excessive water loss by the soil.
	Ammophila	3	……These plants have high stomatal conductance and high rates of photosynthesis and transpiration when water is available but lose (shed) their leaves and enter dormancy under conditions of low water potential.
	trichophyllus	4	……Plants that cannot escape periods of drought can adapt to these conditions by avoidance and/or tolerance.
	arido-passive or Drought evader xerophytes	5	…… Drought tolerance refers to the species specific and adaptable capacity of protoplasm to endure severe loss of water.
	malacophyllous	6	……species in the sands and ……...species in the mountains, both of which bear large attractively-coloured flowers. Needless to say, these two species are insect pollinated
	Tribulus, Capparis	7	In some xerophytic grasses the epidermis of the upper surface of the leaves have *specialized motor cells* (*hinge cells*) responsible for minimizing the leaf area as in ……

Faculty of Science Botany& Microbiology Department		كلية العلوم قسم النبات والميكروبيولوجى
Ecology of Xerophyte and Halophyte Plants 492 N **Time: Two hours** **Total degree: 50 marks**		**Second semester exam - the academic year 2024/2025** **Fourth Level** **Exam date: Sunday, 1/6/2025**

Q1- Please choose the right answer.

1- How do halophytes deal with high soil salinity?

a- Closing stomata b- Salt excretion c- Reducing leaf number

2- Which of the following is not a mechanism used by halophytes to manage salt stress?

a- Leaf abscission b- Storage in vacuoles c- Selective ion uptake

3- What is the most critical factor influencing halophyte growth?

a- Soil salinity b- Water depth c- Temperature

4- Temperature extremes affect halophytes by ……..

a- Preventing seed formation b- Enhancing water absorption c- Limiting photosynthesis and metabolism

5- Compared to non-halophytes, halophytes are…….

a- Equally tolerant to drought b- More tolerant to temperature extremes c- Not affected by temperature

6- …… Which environmental factor adds extra stress in saline environments due to its irregularity.

a- Water availability b- Soil minerals c- Air humidity

7- Some halophytes are adapted to:

a- Constant rainfall b- Drought periods c- Low salt levels

8- What effect does light intensity have on halophytes?

a- Increases growth only b- Leads to excessive water loss c- Has no impact

9- Restricting heavy metal translocation into shoot is defined as phytostabilization not phytoextraction
a) True b) False

10- Ozone damages can be monitored by chlorite flakes of pine needle not by their roots

a) True b) False

Question (2): Answer only five from the following questions (40 Marks = 8 x 5)

1. **Write on the factors that govern the presence of bioindicator in environment.**
2. **How can higher plant and microbes, as bioindicators, respond biologically?**
3. **What is the type of pollution that may be faced by plant in roadside environment? On the basis of bioindicator, explain a case study assessing the relevant pollution.**
4. **Bioindicators have the ability to indicate indirect biotic effects of pollutants when chemical and physical measurements cannot, explain.**
5. **On scale of the lab, what are the major parameters that can judge and assess the polluted plants?**
6. **What are the criteria for selecting bioindicators and general biomonitoring tools?**
7. **Write on the criteria of water pollution and how can be biologically monitored?**

BEST WISHES

Course coordinator and Examiner

DR/ Amany Abeed

Faculty of Science Botany & Microbiology Department		كلية العلوم قسم النبات والميكروبيولوجى
Pollution and Bioindicators (BT 404) Time: two hours Exam Mark: 50	The academic year 2025 Special program for Plant Biotechnology and Microbiology Exam date: Monday, 02/06/2025	

Question (1): choose answer a, b, c, or d in the following statements (10 Marks)

1- A bioindicator may be a higher plant that monitor the health of environment

a) True b) False

2- A good bioindicator provide additional information about intensity and amount of pollution exposure

a) True b) False

3- Cell biology and genetics system can be used as biomonitoring and bioindicator tools

a) True b) False

4- Biotic factors in an ecosystem refer to
a) Non-living elements
b) Physical features
c) Living organisms
d) Climate conditions

5- The primary mechanism of electrochemical cleaning of heavy metals from the soil is....
a) Absorption
b) Ion exchange
c) Oxidation
d) Filtration

6- Soil micro-organisms contribute to the remediation of heavy metal-contaminated soil by
a) Enhancing metal concentration
b) Facilitating metal absorption
c) Increasing soil acidity
d) b and c

7- Heavy metals uptake can be restricted by

a) Stomta closure so that lower flux of metals into the plant
b) Initiation of root hairs
c) Increasing cell wall thickening
d) a and c

8- Halophytes accumulate synthesis osmotically compatible solutions such as proline, glycine betaine in their shoots to increase their ability to combat heavy metal pollution
a) True b) False

24- Bioaerosols can easily spread within areas where pathogens are handled for research and clinical purposes, and thus ..... are the two indoor environments with perhaps the greatest potential for the aerosolization of pathogenic microorganisms. This indicates the importance of.....

a- Hospitals and microbiology laboratories, bioaerosol control methodologies
b- Schools, medical education
c- Sports clubs, athletics

25- Which of the following bacteria produces toxins?

a- *Clostridium botulinum*
b- *Staphylococcus aureus*
c- All of the above

19- Due to the ubiquity of Gram-negative bacteria, especially in soil, ... that is also referred to as endotoxin, is considered by some scientists to be the most important aerobiological allergen.

a- Lipopolysaccharide
b- Teichoic acid
c- Peptidoglycan

20- Given below are two statements:

Statement I: Intramural aeromicrobiology is the study of microorganisms associated with outdoor environments.

Statement II: Some pathogens are uniquely adapted for survival and transmission in the intramural environment. One good example of such an organism is *Legionella pneumophilia*, the causative agent of Legionnaires' disease which is a severe form of pneumonia.

In light of the above statements, choose the correct answer from the options given below:

a- Both Statement I and Statement II are false
b- Statement I is false and Statement II is true
c- Both Statement I and Statement II are true

21- There is still debate about the modes of influenza transmission, specifically whether influenza is mainly transmitted via true bioaerosols, or by droplets, or by direct or indirect contact. History of major influenza pandemics includes .....

a- Spanish flu (1918–1920) and Asian flu (1957–1958)
b- Hong Kong flu (1968–1969) and Swine flu (2009–2010)
c- All of the above

22- Geo-indigenous pathogens are those found in soils and are capable of metabolism, growth and reproduction; many of which are spore formers such as ..... where such spores can potentially be aerosolized.

a- *Bifidobacterium bifidum*
b- *Bacillus anthracis*
c- *Rhizobium leguminosarum*

23- Given below are two statements:

Statement I: Waste disposal is a multibillion dollar industry in the United States. However, there is a potential threat for bioaerosol production via various methods of land application of biosolids and also loading operations.

Statement II: Major hazards associated with waste effluents are pathogenic microorganisms including bacteria, protozoa and helminths

In light of the above statements, choose the correct answer from the options given below:

a- Both Statement I and Statement II are false
b- Statement I is false and Statement II is true
c- Both Statement I and Statement II are true

13- According to the biological hierarchy, the biosphere is made up of.....

a- Populations
b- Communities
c- Ecosystems

14- Given below are two statements:

Statement I: The airborne epidemic spread of *Phytophthora infestans* spores causing the late blight of potato led to the 1845 Irish famine
Statement II: Late blight can destroy potato crops in a fortnight.

In light of the above statements, choose the correct answer from the options given below:

a- Both Statement I and Statement II are true
b- Both Statement I and Statement II are false
c- Statement I is true and Statement II is false

15- Which among the following is not a nitrogen fixing bacterium?

a- *Rhizobium leguminosarum*
b- *Azotobacter chroococcum*
c- *Escherichia coli*

16- An example of the importance of bioaerosols in the spread of airborne diseases is the occurrence of ..... 2001 crisis in the United Kingdom where this ..... disease is a highly contagious disease of cloven-hoofed livestock.

a- tuberculosis , bacterial
b- aspergillosis , fungal
c- foot-and-mouth disease , viral

17- Airborne ..... can cause both allergic reactions and chemical toxigenic responses from direct exposure to spores, cell wall components and mycotoxins.

a- Viruses
b- Molds
c- None of the above

18- Given below are two statements:

Statement I: Mechanisms of phosphate solubilization by phosphate solubilizing microorganisms involves release of organic acids and liberation of extracellular phosphatases
Statement II: *Thiobacillus* sp. can produce sulphuric acid through Sulphur oxidation which cause dissolution of phosphates

In light of the above statements, choose the correct answer from the options given below:

a- Both Statement I and Statement II are false
b- Statement I is true and Statement II is false
c- Both Statement I and Statement II are true

7- Given below are two statements:
Statement I: Because most microorganisms have limited ability to survive when suspended in the atmosphere, the most common scales of its transport in the air considered are the mesoscale and macroscale.
Statement II: Spreading of the airborne phytopathogen *Phytophthora infestans* is an example of the submicroscale transport of pathogens in the aeromicrobiological pathway

In light of the above statements, choose the correct answer from the options given below:
a- Both Statement I and Statement II are true
b- Both Statement I and Statement II are false
c- Statement I is true and Statement II is false

8- The decomposers in an ecosystem are .....
a- Animals
b- bacteria and fungi
c- plants

9- In which of the following biological hierarchy level the properties of life emerge?
a- Molecules
b- Cells
c- Organisms

10- Given below are two statements:
Statement I: Most microorganisms are unicellular where their cells perform all activities required for life
Statement II: Microorganisms are key drivers of the planet's biogeochemical cycles

In light of the above statements, choose the correct answer from the options given below:
a- Both Statement I and Statement II are true
b- Both Statement I and Statement II are false
c- Statement I is true and Statement II is false

11- The two major processes in ecosystem dynamics are .....
a- Matter and energy
b- Reproduction and adaptation
c- Water and nutrients

12- Given below are two statements:
Statement I: Biological entities suspended in air are called planktons
Statement II: Spores of wheat rust can spread thousands of miles and infect other wheat crops downwind, causing catastrophic losses to wheat crops.

In light of the above statements, choose the correct answer from the options given below:
a- Statement I is true and Statement II is false
b- Statement I is false and Statement II is true
c- Both Statement I and Statement II are true

Assiut University
Faculty of Science
Department of Botany & Microbiology

جامعة أسيوط
كلية العلوم
قسم النبات والميكروبيولوجى

Food Microbiology &Biotechology (406B)
4th level (Biotechnology Students)

Final Exam: 18th May 2025
Time allowed: 2 hours

Answer the following: **(50 Marks)**

Q1: Identify 10 only of the following: (15 Marks)

a-CRISPR	b-Foodborne pathogenic bacteria
c-Epigenetics	d-DNA methylation
e-RNAi	f-Food spoilage
g-Pasteurization	h-Chromatin remodeling
i-Salmonellosis	j-Bacteriocin
k-fermented meat products	l-Listerosis

Q2: Write on 7 only of the following: (35 Marks)

1-Biogensis of miRNA
2- CRISPR-Cas9 mode of action
3-Mechanism of siRNA
4-Delivary of siRNA
5-Causes of food spoilage
6-*E. coli* O157-H7 as foodborne bacteria
7- *Salmonella* as foodborne bacteria
8-Benefits of probiotics
9-Mechanism of probiotics as antimicrobial

Best wishes ..... Prof. Naeima Yousef

Assiut University
Faculty of Science
Department of Botany and Microbiology

Microbial Ecology (B494)
S2-2024/2025
Final Exam, 50 marks

[Part A]: Choose the Correct Answer for the following questions. (25 points)
(Each question worth one mark)

1- **In moist environments within buildings, ... can proliferate rapidly within days and become established as colonies on solid surfaces, subsequently releasing toxins and/or allergens into the air.**
   a- molds and bacteria
   b- viruses
   c- None of the above

2- **Given below are two statements:**
   Statement I: In terms of numbers, microbes represent most of the diversity of life on Earth and are found in every environment.
   Statement II: Despite the pathogenicity of some microbes, many others are beneficial and contribute to the quality of human life.

   In light of the above statements, choose the correct answer from the options given below:
   a- Both Statement I and Statement II are false
   b- Statement I is true and Statement II is false
   c- Both Statement I and Statement II are true

3- **Name the process by which nitrogen return back to the atmosphere as atmospheric nitrogen gas by bacterial conversion of various nitrate salts?**
   a- Nitrogen Fixation
   b- Nitrification
   c- Denitrification

4- **By processing waste materials and dead organic matter, which of the following organisms adds to the CO_2 pool?**
   a- Producers
   b- Decomposers
   c- None of the above

5- **Numerous plant pathogens are spread by the aeromicrobiological pathway such as .....**
   a- *Puccinia graminis* and *Ustilago tritici*
   b- *Phytophthora infestans* and *Erysiphe graminis*
   c- All of the above

6- **..... are considered as primary producers in an ecosystem?**
   a- Animals
   b- Plants and algae
   c- Fungi

Part II: Bacterial Symbiosis (25 mark)

A. Answer Only three questions. Use well labeled diagrams where appropriate. (12 marks)

1. Explain how specific flavonoids activate specific *Rhizobium* in the soil.
2. Illustrate the Function and structure of nitrogenase enzyme
3. Discuss the mechanism of luminescent bacteria in the squid to produce light
4. Illustrate how the normal flora protects the host against infection by pathogenic organisms.

B. Write short notes on Only three of the following: (6 marks)

1. *Agrobacterium tumefaciens*
2. *Riftia pachyptila*
3. *Frankia*
4. *Buchnera aphidicola*

C. Choose the correct answer to the following questions. (7 marks)

1. ***Gunnera* possesses unique qualities that allow it to attract specialized .....to provide the plant with fixed nitrogen**
   A) actinomyctes B) cyanobacteria
   C) rhizobia D) Azotobacter

2. **How many molecules of ATP are required to fix one molecules of nitrogen?**
   A) 20 B) 6
   C) 16 D) 10

3. **..... slow-growing bacteria, N-fixation and nodulation functions are encoded on their chromosome**
   A) *Bradyrhizobium* B) *Agrobacterium tumefaciens*
   C) *Rhizobium* D) *Frankia*

4. **How does a legume plant benefit from rhizobia that living within the legume root nodules?**
   A) Rhizobia supply an available form of nitrogen to the legume plant.
   B) Rhizobia convert organic N to inorganic N.
   C) Rhizobia protect legumes from pathogenic organisms.
   D) Rhizobia supply carbon compounds (sucrose) to the legume plant.

5. **Aquatic fern which is an excellent biofertilizer**
   A) *Gunnera* B) *Frankia*
   C) *Azolla* D) *Marsilea*

6. **A free-living nitrogen fixing bacterium is _____**
   A) *Clostridium* B) *Azotobacter*
   C) *Rhizobium* D) Both A and B

7. **Leghaemoglobin is found in _____**
   A) Root nodules of legumes B) Mycorrhiza
   B) Coralloid roots D) Cyanobacteria

With My Best Wishes

Dr. Nivien Nafady ***Dr. Shymaa Ryhan***

Assiut University Faculty of Science Botany & Microbiology Department	كلية العلوم جامعة أسيوط	Second Semester: May 2025 The time allowed: 2 hours Total marks: 50 Marks Course: Symbiosis Microbiology (496B)

Part I: Fungal Symbiosis:

Q1: True (√)-False (X) Questions: (5 marks)

1. Tripartite associations found in orchid plants, as they involve the orchid, the ectendomycorrhizal fungus and the ectomycorrhizal host plant. ( )
2. Fruticose lichens are either shrub-like small mounds, growing up from the ground, or beard-like, small tangles, attached to the substrate only at their bases. ( )
3. Hyphal bridges as extraradical mycelium occur between roots of adjacent plants and can act as a mechanism for the transfer of nutrients between hosts. ( )
4. Pegs of monotropoid mycorrhiza surrounded by finger-like projections of fungus-derived wall material. ( )
5. The presence of rough endoplasmic reticulum and balloon-like Golgi equivalents in AMF spores act as storage compartments. ( )

Q2. Differentiate between: (Answer 2 Only) (6 marks)

A. Foliose and fructicose.
B. Arbutoid and monotropoid mycorrhizas.
C. Sexual and vegetative reproduction of lichen.

Q3. Discuss the function of the following: (Answer 3 only) (6 marks)

A. Vesicles.
B. Orchid mycorrhizas.
C. Extraradical mycelium of AM fungi.
D. Lichen.

Q4: Write short notes on: (Answer ٤ only) (٨ marks)

A. Development of intraradical hyphae of AM fungi.
B. Life cycle of AM fungi.
C. Structure characteristics of ectomycorrhizal fungi.
D. Sources of mycorrhizal hyphae that penetrate the epidermal root cells.
E. Grouped of mycorrhizal plants.

انظر خلفه

.....
.....
.....
.....
.....
.....
.....
.....
.....

With best regards ----------Professor Dr: Sanaa Mohamed Fahmy

Part 3: Write on (5 marks)

1- **Siderophores production?**

2- **Phosphate solubilization?**

9. Nodules range from……..

a- 1-5 cm b- 1-7 cm c- 1-9 d- 1-15 cm

10. …….inserts into the cytoplasmic membrane of bacteria in a calcium-dependent fashion, forming ion channels, triggering the release of intracellular potassium.

a- Daptomycin b- Tetracycline c- Spectinomycin d- Macrolides

11…….acts by inhibiting the beta-ketoacyl synthases I/II(FabF/B)

a- Daptomycin b- Tetracycline c- platensimycin d- Macrolides

12. *Rhizobium* spp. and *Bacillus* spp produced……for phosphate solubilization

a-gluconic acid b- 2-ketogluconic acid c- oxalic acid d- malonic acid

13. β-lactam ring is present in ....

a- Streptomycin b- Neomycin c- Tetracycline d- Thienamycin

14. *Streptomyces* ..... produce boromycin

a- *fradiae* b- *griseus* c- *antibioticus* d- *venezuelae.*

15. Actinomycetes are known to produce……

a- pyruvate b-lactate c- α-ketoglutarate d- all of them

16. Actinobacteria have ability to secrete ..... Enzymes

a- Cellulases b- Pectinases c- keratinases d- all of them

17. *Streptomyces*…… responsible to a distinct soil odor

a- *fradiae* b- *griseus* c- *antibioticus* d- *venezuelae.*

18. Streptomyces ……produce the antibiotic lomofungin

a-*fradiae* b-*griseus* c-*antibioticus* d-*Lomondensis*

19. *Streptomyces platensis* produce the antineoplastic drug ……..

a-bleomycin b-neomycin c-migrastatin d- actionmycin

20. Neomycin produced by *Streptomyces* ……..

a- *griseus* b- *cattleya* c- *fradiae* d- *clavuligerus*

21. *Streptomyces* ..... produce boromycin

a- *fradiae* b- *griseus* c- *antibioticus* d- *venezuelae.*