20- Energy flows through an ecosystem, usually entering as ..... and exiting as .....

a- light energy - thermal energy
b- chemical energy- kinetic energy
c- None of the above

21- Except for some viruses, spores and spore-forming bacteria, most microorganisms have limited ability to survive when suspended in the atmosphere and thus, the most common scales considered for their transport in the air are the ..... and .....

a- mesoscale and macroscale
b- submicroscale and microscale.
c- None of the above

22- ..... bacteria produce sulphuric acid through sulpher oxidation and cause dissolution of rock phosphates.

a- *Staphylococcus epidermidis*
b- *Lactobacillus rhamnosus*
c- *Thiobacillus thiooxidans*

23- ..... are free non-symbiotic nitrogen fixing bacteria widespread in soil.

a- *Streptococcus*
b- *Azotobacter*
c- *Lactobacillus*

24- The highest level of biological organization is ..... while ..... is the lowest level that can perform all activities required for life where most microorganisms are unicellular.

a- the ecosystem – tissues
b- the biosphere - the cell
c- the community - an organelle

25- Given below are two statements:

<u>Statement I:</u> The epidemic spread of wheat rust and the resulting economic destruction produced are indicative of the impact that airborne microbial pathogens can have on agriculture.

<u>Statement II:</u> Spores of wheat rust are capable of spreading hundreds to thousands of kilometers through the atmosphere where in 1993, one type of wheat rust (leaf rust) was responsible for the loss of over 40 million bushels of wheat in Kansas and Nebraska alone.

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

Assiut University-Faculty of Science- Botany and microbiology department

First semester (2023/2024)-Final exam of Actinomycetes (472 B).
Bachelor's degree (Fourth level) **Date: 2/6/2024**

Time: 2 hour **degree: /50**

Answer the following question

Part 1: choose (True) or (False) in the following sentences:- (25 marks)

1. ***Frankia*** **infects the root cells of actinorhizal plants through either intracellular root-hair infection or intercellular root invasion**
   A) True B) False

2. **Symbiotic nitrogen fixation: Is carried out by free living diazotrophs.**
   A) True B) False

3. **Several endophytic actinobacteria exhibited N-fixing ability which includes *Arthrobacter, Agromyces, Corynebacterium, Mycobacterium***
   A) True B) False

4. **Streptomycin was effective antibiotic against tuberculosis.**
   A) True B) False

5. ***Frankia*** **supplies most or all of the host plant nitrogen needs without added nitrogen**
   A) True B) False

6. **Reproductive hyphae called spore-bearing mycelium.**
   A) True B) False

7. **Hopaniods thicken and stabilize the walls which help to keep oxygen with the nitrogenase**
   A) True B) False

8. ***Frankia alni*** **causes root hair deformation in a way that it enters the cortical cells and induces the nodule formations.**
   A) True B) False

9. **Streptomycin antibiotics act as bactericidal agents.**
   A) True B) False

10. ***Frankia*** **secrete extracellular proteins that might be involved in processes like bacteriolysis, hydrolysis, and virulence.**

A) True B) False

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

A) True B) False

12. **Actinobacteria prefer alkaline growth condition.**

A) True B) False

13. ***Frankia*** **has symbiotic relationships with numerous dicot plants and is said to be responsible for 10% of the biologically fixed nitrogen in the world.**

A) True B) False

14. **Researcher have reported high siderophore production by *Streptomyces* sp., *Pseudonocardia* sp. *and Arthrobacter* sp.**

A) True B) False

15. **One type of symbiotic relationship including plant, mycorrhiza, and Frankia is called a tripartite relationship**

A) True B) False

16. **Streptomycetes produce antifungal compounds including nystatin from *Streptomyces nodosus.***

A) True B) False

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

A) True B) False

18. **Diazovesicles are the thick-walled (containing hopanoids), spherical cells in which reductive nitrogen fixation occurs**

A) True B) False

19. **Heterobactin is a siderophore of *Rhodococcus* and *Nocardia.***

A) True B) False

20. Organic acid secretion results in acidification thus leading to proton substitution of Ca^2 and solubilizing mineral phosphate.

A) True B) False

21. All Streptomyces spp. are aerobes.

A) True B) False

22. Chloramphenicol is a bactericidal antimicrobial.

A) True B) False

23. All *Frankia* strains tested make "vesicles" in N-deficient culture, and in symbiosis.

A) True B) False

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

A) True B) False

25. Streptomyces spp. produce about 70% of natural antibiotics.

A) True B) False

Part 2: choose correct answer in the following sentences: - (25 marks)

26. . .....of phosphorus remains in insoluble form, thus unavailable to plants.

a- 85–95% b- 95–99% c- 45-50% d- 20-65%

27. Plant growth promoting rhizobacteria are classification based on their functional activities as.....

a- Biofertilizers b- Phytostimulators c- Rhizoremediators. d- all of them

28. Plant growth promoting rhizobacteria help in .....

a- disease management b- growth promoting activity

c-maintain nitrogen level in agricultural soil d- all of them

29. 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

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

a-N2 fixation+ phosphate solubilization+ siderophores b- phosphate solubilization

c- siderophores d- N2 fixation

31. Some of P-solubilizing actinomycetes, including:

a- *Arthrobacter* b- *Arthrobacter* +*Streptomyces* + *Bacillus*
c- *Bacillus* d- *Streptomyces*

32. Organic acids such as ..... have also been reported amongst phosphate solubilizers.

a- glycolic acid b-oxalic +propionic acid c-malonic +citric acid d- all of them

33. Actinomycetes are known to produce ..... such as in varying concentrations that solubilize mineral phosphate

a- pyruvate+lactate b- α-ketoglutarate+succinate c- malate +oxalate d- all of them

34. Microbes produce variety of siderophores and a major class includes .....

a- catechols b- hydroxamate c- catechols and hydroxamate d- No one

35. In the aerobic environment, iron occurs principally as ..... in insoluble

a- Fe2 b- Fe3 c- Fe d- Fe4

36. .....of iron form, thus making it generally inaccessible to both plants and microorganisms.

a-Oxides b- hydroxides c- oxyhydroxides d- hydroxides and oxyhydroxides

37. Bacterial IAA affects.....

a-plant cell division b- extension c- differentiation d- all of them

38..... act in the 16SrRNA that is part of the 30S ribosome subunit

a- Streptomycin b- Kanamycin c-Gentamicin d- all of them

39.....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

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

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

41. Streptomyces are:

a- All strict anaerobes b- Predominantly found in soil

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

42. Nodules range from.....

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

43. *Streptomyces* ..... produce boromycin

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

44. Iron chelation by microbial siderophores from soil depends on its .....

a- pH b- concentration c- redox potential d- pH, concentration, redox potential

45. *Streptomyces*..... responsible to a distinct soil odor

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

46. *Streptomyces platensis* produce the antineoplastic drug .....

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

47. Neomycin produced by *Streptomyces* .....

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

***48.* Family streptomycetaceae include.....**

a- Streptomyces b- Streptoacidiphilus c- Kitasatospora d- all of them

49. β-lactam ring is present in ....

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

50. Streptomycin belongs to the antibiotic class.....

a- Aminoglycosides b- Macrolides c- Lipopeptide d- chloramphenicol

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

Assiut University
Faculty of Science
Department of Botany and Microbiology

Food Microbiology (B498)
S2-2023/2024
Final Exam , 50 points

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

1- Relative humidity of food storage places environment is one of the ..... that affect the presence of microorganisms in food and spoilage of .....
- a- intrinsic growth factors – fresh meat
- b- extrinsic growth factors – dried food products and stored dry grains.
- c- None of the above

2- Major sources of food microbial contaminationn include .....
- a- dust, sewage, insects and rodents
- b- equipment and personal hygiene of food handlers and food industry employees
- c- All of the above

3- The bacterium that cause wine spoilage and turns it into vinegar is ..... because of its ability to oxidize ethanol to acetic acid.
- a- *Klebsiella pneumoniae*
- b- *Bifidobacterium bifidum*
- c- *Acetobacter aceti*

4- Which of the following is not an intrinsic factor that affect the presence of microorganisms in food?
- a- pH
- b- Storage temperature
- c- Antimicrobial substances

5- A foodborne disease outbreak occurs when .....
- a- two or more people get the same illness from the same contaminated food or drink.
- b- food contains active *Lactobacillus* cells.
- c- None of the above

6- ..... is potentially suitable for food industry applications as a natural ..... due to its antimicrobial properties where it is directly added to or coated on the surface of some food products.
- a- Lysozyme - preservative
- b- sucrose - sweetener
- c- All of the above

7- Which of the following is a sterilization method?
- a- Pasteurization
- b- Freezing
- c- Autoclaving

8- The foodborne infection occurs .....

a- when the pathogenic microorganism itself is ingested with the food, establishes itself in the host's body, and multiplies to significant enough numbers to cause illness.
b- only in persons who have compromised immune systems
c- None of the above

9- The collective term for disease causing microorganisms is called .....

a- Pathogen
b- Microbiota
c- Microbiome

10- Given below are two statements:

Statement I: Drying is an old common method of meat preservation where it removes moisture from meat products so that microorganisms cannot grow. Dried meat is capable of being stored at room temperature without rapid spoilage.

Statement II: Examples of foods other than dried meat that can be preserved by drying to be stored at room temperature include powdered milk, dried fruits, dried vegetables and many other food industry products.

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

11- John Snow (1849) proposed that cholera was not transmitted by bad air but by a water-borne infection. The genus of the causative agent bacterium of this disease is ..... which was first isolated in pure form by Robert Koch in 1884.

a- *Clostridium*
b- *Vibrio*
c- *Staphylococcus*

12- Botulinum toxin is .....

a- Endotoxin
b- Myotoxin
c- Neurotoxin

13- Given below are two statements:

Statement I: Chemical preservatives are added to food to prevent or slow down the growth of microorganisms, thereby increasing the shelf life of the product.

Statement II: Sodium nitrate, sodium nitrite and organic acids like sorbic and benzoic acids are used as chemical food preservatives in food industry of some food products.

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

14- Which of the following strains of *Escherichia coli* is a life threatening foodborne pathogen, responsible for several food poisoning outbreaks.

a- *Escherichia coli* Nissle 1917
b- *Escherichia coli* O157: H7
c- None of the above

15- The enzyme that can kill gram positive bacteria is called .....

a- Lysozyme
b- Invertase
c- Amylase

16- Although Canning is a good modern method of food preservation, ... can grow well in improperly sterilized canned food.

a- facultative anaerobes and anaerobic bacteria
b- obligate aerobic bacteria
c- viruses

17- There are risks with vacuum sealed food products. Some harmful ..... that only grow in air-free settings, can grow much better and faster in vacuum sealed products if not kept in the refrigerator for short-term food handling periods or in freezer for long-term preservation.

a- obligate aerobic bacteria
b- anaerobic bacteria
c- viruses

18- ..... is a food processing technology considered as one of the ..... in which sterile containers are filled with pre-sterilized food product and sealed within the confines of a hygienic environment.

a- Aseptic packaging – modern types of food preservation
b- secondary packaging - old types of food preservation
c- None of the above

19- Given below are two statements:
<u>Statement I:</u> Botulinum toxin is heat stable and can not be inactivated by cooking.
<u>Statement II:</u> Botulism is named after the Latin word for sausage, *botulus*. This is because the first reliable case of botulism was caused by spoiled blood sausages in Germany.
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- Statement II is true and Statement I is false
c- Both Statement I and Statement II are false

20- The most common cause of food intoxication include .....

a- *Staphylococcus aureus*, *Bacillus cereus* and *Clostridium botulinum*
b- *Acetobacter aceti* and *Lactobacillus reuteri*
c- All of the above

21- Peter Durand (1819) developed canning preservation of foods in steel cans. This type of food preservation was later widly used in food industry all over the world where testing the presence of ..... is used for evaluating the efficacy of the sterilization process of canning food products.

a- *Rhizobium leguminosarum*
b- *Clostridium botulinum*
c- *Acetobacter aceti*

22- ..... is of crucial importance for manufacturing dairy products such as cheese and fermented milks and was first isolated and purified by Joseph Lister (1878) in pure culture by serial dilution from sour milk.

a- *Lactococcus lactis*, formerly named *Streptococcus lactis*
b- *Acetobacter aceti*
c- *Klebsiella pneumoniae*

23- ..... cause foodborne illness in humans such as gastroenteritis when contaminated food is consumed. Marie von Ermengem (1896) was the first to prove that this bacterium caused a fatal disease in humans who consumed contaminated sausage.

a- *Rhizobium leguminosarum*
b- *Lactobacillus rhamnosus*
c- *Salmonella enteritidis*

24- Which of the following bacteria is used in food industery?

a- *Lactobacillus*
b- *Staphylococcus*
c- *Mycobacterium*

25- William Budd (1856) suggested that water contamination with faeces from infected person spread typhoid fever and advocated the use of ..... in water supply to overcome the problem.

a- Chlorine
b- Sodium Chloride
c- Antibiotics

Faculty of Science
Botany & Microbiology Department
2nd Semester 2023-2024

Final Exam: Fourth Level
Course Code: 498 B
Course Title: Food microbiology
Allowable Time: 2 hours

I- Answer Only Four of the following questions: (5 marks for each)

1- Write on the Bacterial Groups and their importance in foods.

2- Enumerate the Microbial Proteins & Food Additives with special reference to (SCPs).

3- Write on the Water Activity (A_w) and Growth.

4- Give short notes on the Categories of Immobilized Enzymes (with drawing).

5- Discuss the general characteristics of food poisoning.

II- Define Only Five of the following terms: (One mark for each)

Probiotic – Bacteriocin – Bioactive - Coliform – Fermentation – Infestation – Kimchi – *Listeria monocytogenes* – Inactivation – Relieve.

Good Luck
Khalid A. Hussein, Ph.D.

Final-Term Exam
2024

Botany & Microbiology Department | **Plant tissue culture (454 B) Credit hours** | **Time: 2 hours**

Q1) a. Choose the correct answer: ***(15 Marks)***

1. **The production of secondary metabolites requires the use of _____.**
   a) Meristem
   b) Cell suspension
   c) Axillary buds
   d) Protoplast
2. **What are somaclones?**
   a) Plants chemically identical to the original plant
   b) Plants morphologically identical to the original plant
   c) Plants anatomically identical to the original plant
   d) Plants genetically identical to the original plant
3. **Cybrids are produced by.**
   a) The nucleus of one species but cytoplasm from both the parent species
   b) The fusion of two same nuclei from the same species
   c) The fusion of two different nuclei from different species
   d) None of the above
4. **Haploid plants can be obtained from_____.**
   a) Anther culture
   b) Root culture
   c) Leaf culture
   d) Bud culture
5. **Totipotency refers to _____.**
   a) Development of fruits from flowers in a culture
   b) Development of an organ from a cell in a culture medium
   c) Flowering in a culture medium
   d) All of the above
6. **Which of the following vectors is used in crop improvement and crop management?**
   a) Agrobacterium
   b) Phasmid
   c) Cosmid
   d) Plasmid
7. **Which of the following plant cells shows totipotency?**
   a) Cork cells
   b) Xylem vessels
   c) Sieve tube
   d) Meristem
8. **What is plant tissue culture?**
   a) The technique of *in vitro* maintaining and growing cells
   b) The technique of *in vivo* growing cells
   c) The technique of growing plants in gardens
   d) The technique of cutting plants
9. **The capacity to generate a whole new plant from any cell is known as micropropagation.**
   a) False
   b) True

10. What are somatic hybrids?

a) Hybrid protoplasts
b) Fused Chloroplast
c) Fused plasmids.
d) Protoplasts

11. Which of the following is not an application of tissue culture?

a) Rapid Clonal Propagation
b) Transgenic plants
c) Embryo rescue
d) Somaclonal Variations

12. What are the benefits of micropropagation or clonal propagation?

a) Rapid multiplication of superior clones
b) Multiplication of sexually derived sterile hybrids
c) Multiplication of disease-free plants
d) All the above

13. Subculturing is similar to propagation by cuttings because.

a) Its separates multiple micro shoots and places them in a medium
b) It uses scions to produce new micro shoots.
c) They both use in vitro growing conditions.
d) All the above

14. The following is a prerequisite for an artificial media used for explant regeneration:

a) The medium should contain a source of sulfur.
b) The medium should have a very low carbon content
c) The medium needs to offer a carbon source
d) The medium must offer a nitrogen donor

15. The problem of necrosis and gradual senescence while performing tissue culture can be overcome by

a) Spraying auxins
b) Suspension culture
c) Spraying cytokinins
d) Subculture

b. Define <u>five</u> only: ***(5 Marks)***

a) Cell-totipotency
b) Microspore culture
c) Somatic embryogenesis
d) Explants
e) Callus
f) micropropagation

Q2) Write note on <u>three</u> of the following: ***(15 Marks)***

a) Production of synthetic seeds
b) Production of virus free plants
c) Protoplast culture
d) Applicatins of somatic hybridization

Q3) Explain <u>five</u> of the following:
(15 Marks)

a) Browning of cultured tissues
b) Epigenetic changes and somaclonal variation
c) The advantages of using liquid medium and bioreactor cultures for micropropagation
d) Vitrification of tissues
e) Genetic Engineering of Plants
f) Germplasm conservation

Good luck

Prof. Dr. Abeer Radi & Prof. Dr. Fatma Aly

2nd Semester (2023-2024) **Symbiosis Microbiology (496B)**
Time allowed: 2 hours Score (50 marks)
الاختبار مطبوع على وجهي الورقة

First part: Fungal symbiosis

Question 1: Label the correct sentence with (√) and wrong one with (x), and rewrite the sentence correctly if it is wrong. (5 marks)

A. Commensalism is a non-mutual symbiotic relationship in which two organisms that are unrelated, usually co-exist over the lifetime of one of the individuals. [ ]

.....

B. Carbohydrates pass from conifer to *Monotropa* via their common mycorrhizal partner, as it is termed a source-sink. [ ]

.....

C. 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. [ ]

.....

D. Pegs of monotropoid mycorrhiza surrounded by finger-like projections of fungus-derived wall material. [ ]

.....

E. The trehalose fungal sugar, is translocated to pelotons where it is metabolized into other carbohydrates, including glucose. [ ]

.....

Question 2: Choose the correct answer. (5 marks)

1. Endomycorrhiza are included .....
   a) Arbutoid b) Ericoid c) Ectendomycorrhiza
2. The genus ..... do not form intraradical vesicles.
   a) *Gigaspora* *b) Scutellospora* c) Both a and b
3. The development of hyphae between root cells to form a complex highly branched structure called .....
   a) Mantel b) Hartig net c) Extraradical mycelium
4. In *Paris*-type of arbuscules, ... spread intracellularly.
   a) Coiled hyphae b) Fine branched c) Both A and B

5. The asymbiotic stage is sometimes referred to as the ..... of the AM fungal cycle.

a) Resting stage b) Dormancy period c) Botha A and B

Question 3: Give a short account on 2 only of the following (use illustration if needed): (5 marks)

a) Vesicles development and structure in mycorrhizal association

b) Reproduction in lichens

c) Facultative mycorrhizal plants

Question 4: Write in details on 2 only of the following (use illustration if needed). (10 marks)

a) Ectomycorrhizal symbiosis

b) Reproduction and life cycle of AM

c) Intraradical hyphae

****

With my best wishes

Prof. Dr. Mohamed Hashem

Part II: Bacterial Symbiosis (25 mark)

A. Answer <u>Only two</u> questions. Use well labeled diagrams where appropriate. (8 marks)

1. Explain the mechanism of luminescent bacteria in the squid turn on the light.
2. Illustrate how *Agrobacterium* causes crown galls disease.
3. Discuss the structure of nitrogenase enzyme and the mechanism of nitrogen fixation in legumes.

B. Write short notes on <u>Only four</u> of the following: (6 marks)

1. *Nod* factors
2. *Frankia*
3. Secondary symbiont
4. Leghemoglobin
5. Uses of *Azolla*

C. Choose the correct answer to the following questions: <u>Kindly write down your answers in the University Examination Answer Book that has been given to you.</u> (11marks)

1. **Nitrogen fixer organisms, which of the following microorganisms is involved?**
   A) non symbiotic microorganisms only
   B) symbiotic microorganisms only
   C) Both A and B

2. **If wheat field is inoculated with *Rhizobium***
   A) soil will become nitrogen rich
   B) soil will become rich in calcium
   C) no effect on soil nitrogen

3. ***Riftia pachyptila* tubeworm houses a dense population of intracellular, ...bacteria, which provide the nutriments to the animal.**
   A) *Agrobacterium tumefaciens*
   B) *Vibrio fischeri*
   C) sulfide-oxidizing

4. ***Buchnera aphidicola* is an endosymbiont of the pea aphid.....**
   A) transmitted maternally
   B) transmitted horizontally
   C) Neither A or B

5. ***Rhizobium* root nodules in legume plants**
   A) nitrify N_2 from the air.
   B) fix N_2 from the air.
   C) fix ammonia from the air.

6. .....released by Legume roots and consider signal to rhizobia in the soil that a Legume is present and ready to nodulate

A) flavonoids
B) Nod factor
C) nodulins

7. *Gunnera* possesses unique qualities that allow it to attract specialized ..... to provide the plant with fixed nitrogen

A) actinomyctes
B) cyanobacteria
C) rhizobia

8. How many molecules of ATP are required to fix one molecules of nitrogen?

A) 20
B) 6
C) 16

9. Nitrogenase enzyme basically works as a.....

A) Oxidation
B) Reduction
C) Both

10. For function of nitrogenase enzyme requires....

A) FAD
B) NADH
C) ATP

11..... slow-growing bacteria, N-fixation and nodulation functions are encoded on their chromosome

A) *Bradyrhizobium*
B) *Agrobacterium tumefaciens*
C) *Rhizobium*

With My Best Wishes

Dr. Shymaa Ryhan

Final Examination
Ecology of Xerophytes and Halophytes (B 442)
4th Level (Special Botany)

Department of Botany & Microbiology
2nd Semester 2023 / 2024

Time allowed: 2 hours
50 Marks

Answer the following questions:

Question 1: **2 x 8= 16 Marks**

a) Summarize the adaptive characters which Volkens was wrote in his monograph on the plants of the Egyptian desert.

b) Briefly, write about the anatomical adaptation of xerophytes.

Question 2: **4 x 2½ = 10 Marks**

- Define the reasons from the following adaptations (Answer 4 points):

a) The large number of stomata on the leaves of many xerophytes.

b) Higher salt secretion rates during the night than during the day in salt-secreting halophytes.

c) The well-developed palisade mesophyll tissue in xerophytes.

d) Size and orientation of leaves of xerophytes.

e) Sunken stomata.

Question 3: **3 x 4 = 12 Marks**

- Compare between (Answer 3 points):

a) Arido-passive and arido-active plants.

b) Slow- and fast-germinating seeds of some xerophytes.

c) Hysteranthus and synanthus geophytes.

d) Drought evaders (or ephimerals) and true xerophytes.

Question 4: **3 x 4 = 12 Marks**

- Write briefly on Three only of the following:

a) Classification of halophytes according to their capacity of salt tolerance.

b) Water use efficiency and physiological adaptation of CAM plants.

c) The main traits of CAM plants; and compare their water use efficiency with that for C3 & C4 plants.

d) What meaning by salt avoidance, tolerance and evasion mechanisms in salt-secreting halophytes.

Good Luck

Prof. Dr. Taha Ramadan

Assiut University
Faculty of Science
Department of Botany and Microbiology

Microbial Ecology (B494)
S2-2023/2024
Final Exam , 50 points

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

1- **Biological material including microorganisms and toxins can be found in air or the atmosphere, and the study of this area is termed ..... where airborne biological materials are known as.....**
   a- Metagenomics – biosphere
   b- aeromicrobiology - bioaerosols
   c- None of the above

2- **..... was discovered after an outbreak of severe pneumonia in 1976 among people who went to a Philadelphia convention of the American Legion. The spread of the bacterium was airborne and the disease was called .....**
   a- *Legionella pneumophila* – Legionnaires
   b- *Brucella melitensis* – Brucellosis
   c- None of the above

3- **Despite the pathogenicity of some microbes, eubacteria and fungi play major beneficial roles in life which include .....**
   a- They are the major decomposers in the ecosystems which perform a valuable service as Earth's cleanup crew.
   b- They play key roles in biogeochemical cycles to recycle chemical nutrients.
   c- All of the above

4- **Aeromicrobiology involves various aspects of .....**
   a- Intramural (indoor) aeromicrobiology
   b- Extramural (outdoor) aeromicrobiology
   c- All of the above

5- **..... is a bacterial geo-indigenous pathogen that causes lethal disease in humans via pulmonary, gastrointestinal or cutaneous modes of infection.**
   a- *Streptomyces griseus*
   b- *Lactobacillus reuteri*
   c- *Bacillus anthracis*

6- **Foot-and-mouth disease is a viral airborne disease that can spread as a bioaerosols through aeromicrobiological pathway where it is highly contagious to .....**
   a- Humans
   b- cloven-hoofed livestock
   c- chickens

7- **In the extramural environment, factors such as ..... modify the effects of bioaerosols by limiting the amount of time that aerosolized microorganisms will remain viable.**
   a- UV radiation
   b- temperature and relative humidity
   c- All of the above

8- **..... produced by ....., is a bacterial neurotoxin that is normally associated with ingestion of contaminated food. However, the lethal dose is so small that aerosolization can also be a means of dissemination where its lethal dose by inhalation is 0.3 µg, with death occurring 12 hours after exposure.**
   a- Botulinum toxin - *Clostridium botulinum*
   b- Staphylococcal enterotoxin – *Staphylococcus aureus*
   c- None of the above

9- **The 1845 Irish famine related deaths are estimated from 750,000 to 1,000,000 where the famine was a result of destroying the potato as a main crop in the country by airborne phytopathogen called ..... which causes .....**
   a- *Phytophthora infestans* - late blight of potato
   b- *Alternaria solani* - early blight of potato
   c- None of the above

10- **In the aeromicrobiological pathway, the process whereby bioaerosols become suspended within Earth's atmosphere is termed .....**
   a- Launching
   b- Transport and deposition
   c- None of the above

11- **Denitrification is the precess of nitrate reduction through bacterial conversion of various nitrate salts to atmospheric nitrogen carried out by denitrifying bacteria such as .....**
   a- *Pseudomonas aeruginosa*
   b- *Rhizobium leguminosarum*
   c- *Azotobacter chroococcum*

12- **Buildings intramural aeromicrobiology refers to many factors that can influence bioaerosols and therefore how healthy or not a building is. These include :..... and others.**
   a- the design and operation of the air circulation systems and the amount of clean outdoor air circulated through the building.
   b- the health and hygiene of the occupants.
   c- All of the above

13- **Decomposers are substantial in an ecosystem because they .....**
   a- make chemical nutrients available to plants through the process of decay.
   b- are autotrophic microorganisms producing food for others.
   c- produce oxygen by the process of photosynthesis.

14- An airborne bioaerosol will eventually leave the turbulence of the suspending gas and will ultimately be deposited on a surface by one or a combination of interrelated mechanisms. These mechanisms are .....

a- gravitational settling , downward molecular diffusion and surface impaction
b- rain deposition and electrostatic deposition
c- All of the above

15- Given below are two statements:
<u>Statement I:</u> Hospitals and microbiology laboratories are the two indoor environments with perhaps the greatest potential for the aerosolization of pathogenic microorganisms.
<u>Statement II:</u> Hospitals, because they are centers for the treatment of patients with diseases, have a high percentage of individuals, including patients and staff, who are active carriers of infectious, airborne pathogens leading to nosocomial infections.

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

16- In the aquatic ecosystems, ... and ..... are considered the main primary producers in their food chain.

a- insects - animals
b- viruses - fungi
c- cyanobacteria - algae

17- Biological oxidation of amonium to nitrite and then to nitrate is conducted by the nitrifying bacteria ..... and ..... respectively.

a- *Escherichia coli – Klebsiella*
b- *Staphylococcus – Lactobacillus*
c- *Nitrosomonas - Nitrobacter*

18- The ..... is responsible for the hyperallergenic reaction of the Lipopolysaccharides (LPS) endotoxins forming the outer membrane of ..... that is liberated and aerosolized when these bacteria are lysed or actively growing in an environment.

a- O-side chain - Gram-negative bacteria
b- core polysaccharide - Gram-positive bacteria
c- lipid A moiety - actinobacteria

19- Legumes are able to form a symbiotic relationship with nitrogen-fixing soil bacterium called .....

a- *Klebsiella*
b- *Spirulina*
c- *Rhizobium*