16. RIA has been largely replaced in routine clinical laboratory practice by EIA.
17. EIA methods have greater analytical sensitivity than FIA methods.
18. Both differential and rate zonal centrifugation, the separation according to the size
19. Washing solution, is a buffer that removes bound antibodies floating in the well.
20. Flame photometer used to determine the concentration of certain metal ions.

Second Question: Write in details about (five only) of the following:- (30 mark)

1. Different types of chromatography (four types).
2. Factors affecting column efficiency (six factors).
3. Types of spectrophotometer.
4. The electromagnetic spectrum.
5. Various cell lysis techniques .
6. Types of rotors.

The end of questions

Good luck

Dr/ Eman

Aldaby

Faculty of Science Botany and Microbiology Dept.		كليه العلوم قسم النبات والميكروبيولوجى
Biotechnical Analysis (B453) Course: Time: 2 hours Marks:50 marks		2024/2025 Level: Fourth

Answer the following questions

First Question:: - Put true (√) or false (×) in the following:- (20 marks)

1. The eluate is the mobile phase leaving the column.
2. Reverse phase chromatography, if the matrix support is polar.
3. For colorless compounds, 2,4-dinitrophenylhydrazine is used as colour agent for aldehydes and ketones in paper chromatography.
4. In isocratic elution, Addition of solvent mixture of fixed composition during the whole process.
5. GC used for separating and analyzing compounds that can be vaporized with decomposition.
6. The Henderson-Hasselbalch equation is valid in the pH range of 2 to 11.
7. In rate zonal separation, density of the sample solution must be more than the lowest density portion of the gradient.
8. The amine buffers (of high pKa) have temperature-sensitive pKa.
9. MES, MOPS, HEPES and TRIS are good buffers and free of side effects.
10. For cleaning the pH-meter from Inorganic deposits: soak the electrode in 0.1 M tetra sodium EDTA for 15 minutes.
11. RCF= $1.112 \times 10^{-5} \times r \times (\text{rpm})^2$
12. Absorption spectrum is a plot of the amount of light absorbed by a sample as a function of wavelength.
13. Used deuterium lamp in ultraviolet light.
14. Flame emission photometry is crude but cheap compared to flame absorbance spectroscopy.
15. Cuvette for FR wavelengths is NaCl and KBr crystals.

1- Lipid-bound proteins in plasma membrane are located entirely within the boundaries of the lipid bilayer ( )

2- Cytoplasm is a viscous, transparent fluid, It consists of the matrix and ground substance ( )

3- Half bordered pits present when a simple pit is opposite to intercellular space that present between cells. ( )

4- Bacterial cell wall mainly composes of polysaccharide peptidoglycan ( )

5- Cell wall of plant cells protect the cell from osmotic shock ( )

6- Golgi apparatus is involved in the packaging of the protein molecules before they are sent to their destination. ( )

7- Most chloroplasts in plant cell contain 100-1000 grana. ( )

8- Endoplasmic reticulum provides an increased surface for various enzymatic reactions. ( )

Good luck

DR/ MAYSA M. A. ALI

Assiut University	**Final exam of: Plant Cytology**
Faculty of Science	**Year: 2024/2025**
Botany & Microbiology Dept.	**Time: 2 hours**
Date: 16/1/2025	**Total marks: 50 marks**

Answer all the following questions

(A) Write on all of the following (20 marks, 4 for each):

1- Origin of cell wall of plant cells

2- Chemical Composition of Plasma Membrane of plant cells

3- Function of Mitochondria of plant cells

4- Structure and Function of thylakoid in plastids of plant cells

5- The roles that vacuoles play in plant cells

(B) Compare between all of the following (16 marks, 4 for each):

1- Outer membrane & inner membrane of mitochondria

2- Rough & smooth endoplasmic reticulum (Function)

3- Simple pits and Bordered pits

4- Leucoplast and Chromoplast

(C) Defined all of the following (6 marks, 1.5 for each) :

1- Plasmodesmata

2- Middle lamella of cell wall

3- Protoplasm of plant cells

4- Peripheral proteins in plasma membrane of plant cells

(E) Use (√) or (☒) for each of the following (8 marks , 1 for each :

10)-Dominant microbe used in microbial Bioassay:

a)Algae b)-Fungi c) bacteria d) Virus

Question4:Place a tick(√)or (x) on the following statements(10 M):

1- Dopamine is the Hormone which keep blood sugar level ( ).

2- Identifying the antibiotic action depend on color changing ( ).

3- Dwarf plant stem referred to decrease in IAA plant hormone ( ).

4- Plan leaves Chlorophyll degradation bioassay referred toGA3 depletion ( ).

5- One unit of Insulin lowers blood sugar by about 50 mg/dL ( ).

6- The stationary phase in chromatography assay is liquid phase ( ).

7- The technique used the plasma to Excit the atoms called IAA ( ).

8- Atomic Absorption spectrophotometry detect the amount of solvent( ).

9- The direct ELISA test is used to test for the presence of specific antibodies in a patient's serum ( ).

10- SDS-PAGE used for the separation of DNA by electrophoresis ( ).

Good Luck ***Prof. Dr. Abdel Wahab El-Enany***

Question 3: Choose the correct answer for the following statements: (10 M):

1)- **ELISA (enzyme-linked immunosorbent assay) allows for rapid screening and quantification of the presence of _____ in a sample.**

a) amino acid b)DNA c)antigen d)protein

2)-**Which technique separates charged particles using electric field?**

A- Hydrolysis B- Electrophresis. C-Chromatography

3)-**Agarose can be extracted from which of the following?**

A- *Lycazusican esculentum* B- *Ficum benghalensis*

C -*Gracilaria esculentus* D- *Agrostis stolonifera*

4)-**Which of the following cannot be used for the separation of nucleic acids?**

A)SDS – PAGE B) PAGE C) Northern blotting D) PAGE

5)-**The polymerization of the gel used in PAGE occurs between polyacrylamide and _____**

a) N, N – acrylamide b) Bisacrylamide c)N – methyleneacrylamide

d) N, N – methylene bisacrylamide

6)-**Colorimetric assays measure**:

a-The density of colour. b-The density of atoms

c-The intensity of compound d-qualitative analysis.

7)-**Generation of plasma needs**:

a- High pressure b-High Temperature C-High Liquid C-Acidic condition

8)-**Plant stem swelling assay referred to** :

a- Ethylene stress condition b) Gucosamine stress condition c- Kinetin overproduction

9)-Identifying the antibiotic action depend on:

a-Color of the Culture b) appearance of clear Zone C) Density of Growth

Question3: Complete the following with suitable answer (10 M):

1-Photodetector means----------

2-Quality control means----------

3-Stationary phase means ----------

4-Microbial assay mean----------

5-Qualitative Bioassay means----------

6-Plant Bioassay means----------

7-Flooding means----------

8-Elisa means----------

9-Quantitative Bioassays mean----------

10-Indirect Bioassay means----------

c- **The concept of Flame photometer (5M):**

d) **The Different types of ELISA (5 M):**

E) **Steps of Colorimetric assay**? (5 M)

كلية العلوم
جامعة أسيوط

بسم الله الرحمن الرحيم

Final Exam for the 4d year Students
(Biotechnology)
Subject: Bioassays
Time Allowed: 2 hours

جامعة أسيوط

Answer The Following Questions:

Question 1: Explain Four of the following:(20 M)

a- **Present and Future applications of Bioassays** (5 M).

b- **Different Techniques used in microbial Bioassay** (5 M):

11. What is the primary factor limiting the commercial viability of algal biodiesel production?

A) High lipid content in algae
B) Low biomass productivity and high cultivation costs
C) Lack of suitable algal strains
D) Insufficient research on algal species

12. Which biodiesel production method is generally considered more environmentally friendly?

A) Chemical transesterification
B) Enzymatic transesterification
C) Direct transesterification
D) Indirect transesterification

13. Which process is considered a more sustainable approach to biodiesel production?

A) Using food crops as feedstocks
B) Cultivating algae in open ponds
C) Utilizing waste oils and fats
D) Relying solely on fossil fuel-derived feedstocks

14. Which of the following statements is true regarding methanogenic bacteria?

A) They thrive in aerobic conditions.
B) They are tolerant to high oxygen concentrations.
C) They are sensitive to oxygen concentration.
D) They require light for growth.

15. Which component of the MFC is responsible for electron transfer?

A) Anode
B) Cathode
C) Proton exchange membrane (PEM)
D) Substrate

Q2: Write on <u>FOUR ONLY</u> of the following: 20 Marks

1. Biochemistry of lipid accumulation by oleaginous microorganisms
2. Biochemistry of Biogas production by microorganisms.
3. Discuss the role of microorganisms in microbial fuel cells and the mechanisms through which they facilitate electricity generation.
4. Discuss the role of microorganisms in biodiesel production and their potential advantages over traditional feedstocks.
5. Discuss the environmental impacts of microbial fuel cells compared to conventional energy generation methods.

Q3: Compare between <u>THREE ONLY</u> of the following: 15 Marks

1. Biohydrogen production through dark and photo fermentation.
2. First and second generation biofuel production.
3. Bacterial and algal biomasses as a feedstock for biodiesel production.
4. Processes and chemical reactions occur on anode and cathode electrodes in MFC.

Good Luck

Dr. Elhagag Ahmed Hassan

Assiut University Faculty of Science Botany & Microbiology Department		جامعة أسيوط كلية العلوم قسم النبات والميكروبيولوجى
Bioenergy (409BT)	Final exam (Jan 2025)	Time: 2 hours
Biotechnology students (4th level)	Total Degree: 50	

Answer the following questions

Q1:- Choose the correct answer:- **15 Marks**

1. What is the primary function of the hydrolysis stage in anaerobic digestion?
A) To convert fatty acids into methane
B) To break down complex organic materials into simpler compounds
C) To produce carbon dioxide and hydrogen
D) To synthesize new microbial cells

2. *Geobacter* species are known for their ability to:
A) Produce volatile fatty acids
B) Transfer electrons directly to electrodes
C) Degrade lignocellulosic biomass
D) Act as a mediator in electron transport

3. Which biodiesel production method is characterized by no soap formation?
A) Direct transesterification
B) Indirect transesterification
C) Enzymatic (Lipase) transesterification
D) Chemical transesterification

4. Which of the following is NOT a source of second-generation biodiesel?
A) Jatropha
B) Soybean
C) Used cooking oil
D) Sugarcane bagasse

5. During the acetogenesis stage, which of the following compounds is NOT typically produced?
A) Acetic acid
B) Butyric acid
C) Methane
D) Hydrogen

6. Which species of bacteria is known for its high power output in MFCs?
A) *Escherichia coli*
B) *Shewanella putrefaciens*
C) *Streptococcus pneumoniae*
D) *Bacillus subtilis*

7. Which of the following statements about hydrogenases is true?
A) They are exclusively found in eukaryotic organisms.
B) They catalyze the production of hydrogen from protons and electrons.
C) They are only involved in aerobic respiration.
D) They are not essential for biohydrogen production.

8. Which of the following statements about the transesterification process is true?
A) It only converts triglycerides to biodiesel.
B) It can utilize both free fatty acids and triglycerides.
C) It is an anaerobic process.
D) It requires high-pressure conditions.

9. What is the main reason for the low yield of hydrogen in the dark fermentation process?
A) Competition with methanogens
B) Inefficient substrate utilization
C) Inhibition by organic acids
D) Low enzymatic activity

10. What is the primary role of acidogenic bacteria in the biogas production process?
A) Hydrolyze complex polymers into monomers
B) Convert long-chain fatty acids into methane
C) Ferment simple sugars into organic acids and gases
D) Produce nutrients for methanogens

Q4) Select the suitable scientific words from the following words, and then fill under-lowering spaces. **10 Marks**

{Stratification – Soaking - Trigger agent - Scarification – advantage – ultrasound - Natural - Artificial - Impaction – Positive - Location of dormancy - Negative - agnetic - Gibberellins - hypogeal - ultrasound - UV rays – Fruits - twigs – germination agent - Viviparous – Epigeal - Phase IV – Lag phase - Orthodox – Phase III - Recalcitrant- disadvantage – leaves - ABA}

1. ..... photoblastic: The presence of light tends inhibit their germination.
2. ..... seeds: This group maintains viability for longer period, when stored at higher moisture level. e.g. lemon.
3. .....: Any process of penetrating the protective seed coat of dormant seeds.
4. .....: is a factor that must be present throughout the germination process.
5. Abrasion by the digestive tract of birds and animals that feed on this seeds.is an example of ..... breaking of seed dormancy.
6. .....of dormancy: plays an important role in the survival of plant species as it distributes germination in time.
7. .....: is perceived by the blue light photoreceptors- cryptochromes and leading to higher germination percentage.
8. Extracts from tomato's ....., have been found to inhibit its seed germination.
9. .....: known as the precocious germination of seeds while still attached to the mother plant.
10. ..... : is characterized by a marked fall in respiration that coincides with the disintegration of the cotyledons.
11. ..... can facilitate seed germination due to their influence on production of hydrolyzing enzymes.

Prof. Dr. T. Ramadan

Prof. Dr. Suzan A. Sayed

Good Luck

Final Examination

Seed biology
Course No.: 411B
Time allowed: 2 hours

Department of Botany & Microbiology
50 Marks
First semester 2024/2025
4th Level (Special Botany)

Answer the following questions:

Q1) Write the scientific term for each of the following: - **10 Marks**

1) The fleshy and brightly coloured seed coat, which attracts animals and birds.
2) The major storage protein in grasses, and it is absent from dicots and gymnosperms.
3) The plant part or unit to be spread, irrespective of its morphological origin.
4) The plant spreading units lack morphological characters facilitating long-distance dispersal.
5) The major storage proteins in grasses which are absent from dicots and gymnosperms.
6) The transfer of pollen grains from the anther to the stigma of the same plant.
7) The enzyme that increases resistance to fungal attack in many monocot and dicot seeds.
8) Dispersal by ants.
9) The embryos which are small, less than 25% of the seed volume, and restricted to the lower half of the seed.
10) Seed dispersal by fish.

Q2) Answer three only: **(3 x 5= 15 Marks)**

1) Account the benefits of seed dispersal for different plant species.
2) Write about the perisperm
3) Explain with a drawing sketch the potential benefits of diplochory.
4) With a diagram, and in a table, compare between the structure of dicot and monocot seeds.

Q3) Write briefly in THREE POINTS ONLY: **(3 x 5= 15 Marks)**

1) Blocks to germination by covering layers.
2) Stages of germination indicating their major events.
3) Viability of seed - Physiological dormancy.
4) Photoreversible germination - The multiple roles played by gibberellin.

42	A bacterial bioagent used for protection of trees against crown gall disease:		
	a- *Agrobacterium radiobacter*	b- *Agrobacterium tumifaciens*	c- *Aspergillus ochraceus*
43	Late blight of potato can be controlled biologically by:		
	a- *Chaetomium globosum*	b- *Coniothyrium*	c- *Myrothecium*
44	Iturin-A, Surfactin and fungycin are bioactive compounds produced by:		
	a- *Bacillus amyloliquifaciens*	b-*Sclerotinia* sp.	c- *Pythium oligandrum*
45	*Trichoderma harzianum* attack plant pathogens by several weapons including:		
	a- Toxins and lytic enzymes	b-Rhizoids	c- Zoospores
46	*Sclerotinia* species form dark colored sclorotia that germinate producing:		
	a- Apothecia	b- Perithecia	c- Pycnidia
47	*Coniothyrium minitans* is formulated as water dispersible granules containing:		
	a- Pycnospores	b- Azygospores	c- Zoospores
48	*Rhizoctonia solani* can be controlled by antagonistic fungi including:		
	a- *Trichoderma*	b- *Botrytis*	c- *Aspergillus*
49	Overgrowth of bioagents on plant pathogenic fungi is called:		
	a- Mutualism	b- Synergism	c- Mycoparasitism
50	Zwittermicin-A is an antibiotic produced by:		
	a- *Bacillus cereus*	b-*Phytophthora* species	c- *Streptomyces* species

========== End of Questions ==========

Best wishes,

Professor Dr. Ahmad M. Moharram

21	*Entomophthora muscae* is the main pathogen of:		
	a- Date palm weevil	b- House flies	c-Ectomycorhizae
22	Capilliconidiophore are formed by certain species of		
	a- *Streptomyces*	b- *Neozygitis*	c- *Colletotrichum*
23	Verticillate arrangement of phialides is characteristic to some fungal species of:		
	a- *Epicoccum*	b- *Lecanicillium*	c- *Sclerotium*
24	A bacterial bioagent contains compounds toxic to the caterpillars and mosquitoes:		
	a- *Cercospora* sp.	b- *Bacillus thuringiensis*	c- *Pythium oligandrum*
25	Constricting rings are nematode trapping structures produced by:		
	a- *Hirsutella* species	b- *Arthrobotrys dactyloides*	c- Yeasts
26	Formation of fungal traps is stimulated by compounds in nematode body such as:		
	a- Chaetomin	b- Nemin	c- Abscisic acid
27	One of the endoparasitic fungal species that destroys nematodes		
	a- *Streptomyces*	b- *Catenaria anguillulae*	c- *Entomophthora*
28	Sporangia of *Catenria* are formed within nematode body and produce		
	a- Biflagellate zoospores	b- Uniflagellate zoospores	c- Non-motile spores
29	*Dactylaria candida* and *Nematoctonus* can kill nematodes with the aid of:		
	a- Long flagellae	b-Adhesive knobs	c- Zygospores
30	Non-constricting rings are formed on prostrate hyphae of:		
	a- *Rhizoctonia solani*	b- *Dactylaria candida*	c- *Trichoderma harzianum*
31	Adhesive networks are produced by some predaceous fungi such as:		
	a- *Streptomyces* spp.	b- *Arthrobotrys oligospora*	c- Vesicular mycorhizae
32	*Monacrosporium cionopagum* attacks nematodes by:		
	a- Resting sporangia	b- Adhesive branches	c- Vellose conidia
33	A compound produced by *Bacillus subtilis* showing antibiosis against *Pythium* species		
	a- Gliotoxin	b- Mycosubtilin	c- Verrucarin
34	Iron chelating compounds produced by bacteria and fungi are called;		
	a- Ferrous sulfate	b- Siderophores	c- Epicoccin
35	*Ampelomyces quisqualis* is a mycoparasite used for biocontrol of :		
	a- Powdery mildew	b- Wilt diseases	c- Anthracnose
36	Gray rot of strawberries can be controlled by spraying plants with:		
	a- *Trichoderma*	b- *Zoophthora radicans*	c- Mycorrhizae
37	Flavipin and Epicorazine are antimicrobial compounds produced by:		
	Epicoccum nigrum	*Fusarium* species	*Streptomyces* species
38	*Bacillus subtilis* is an effective biocontrol agent against:		
	Tobacco Mosiac Virus	b- Damping off diseases	C- Crown gall
39	One of the following can be used as a biofertilizer		
	a- *Sclerotium rolfsii*	b- *Erynia neoaphidis*	c- *Pseudomonas aeruginosa*
40	Plant diseases caused by *Sclotinia* and *Sclerotium* species can be controlled by:		
	a- *Aspergillus niger*	b- *Fusarium solani*	c- *Coniothyrium minitans*
41	*Ampelomyces quisqualis* produces a lot of conidia releasing from:		
	a- Perithecia	b- Sporangia	c- Pycnidia

Assiut University – Faculty of Science
Department of Botany and Microbiology

Course: Biological Control (B 499)
Date: 29 December 2024
Time allowed: 2 hours

Serial No.	Choose the correct answer ……(Total marks=50)		
1	Bacillomycin-D exhibits antibiosis against:		
	a- Cereal aphids	b- Mealy bugs	c- *Fusarium oxysporum*
2	*Coelomomyces stegomiyae* is effective in the biocontrol of:		
	a- Downey midews	b- Locusts	c- Mosquito larvae
3	Induced systemic resistance in plants can be enhanced by treatment with:		
	a- *Botrytis cinerea*	b- *Trichoderma viride*	c- *Rhizopus oryzae*
4	Fungal pathogens of insects penetrate their hosts with the aid of:		
	a- Chitinases	b- Exoskeleton	c- Hyphagens
5	Each trichospore produced by *Smittium culisetae* is provided with:		
	a- Three flagella	b- Chloroplast	c- One appendage
6	*Entomophthora verulenta* can be formulated in a phosphate buffer containing:		
	a- Basiospores	b- Zygospores	c- Ascospores
7	Red Palm weevil can be controlled biologically by:		
	a- *Coelomomyces*	b- *Phyophthora*	c- *Beauveria bassiana*
8	Colony color of *Trichoderma* species is:		
	a- Black	b- Violet	c- Green
9	Conidia of *Metarhizium anisopliae* are:		
	a- Spherical	b- Star shaped	c- Rod shaped
10	Conidia of *Beauveria bassiana* are produced sympodially on:		
	a- Rachis-like cells	b- Pycnidia	c- budding
11	Toxic metabolites produced by *Metarhizium* include:		
	a- Fengycin	b- Destruxins	c- Amylase
12	Induced systemic resistance in plants can be achieved by treatment with:		
	a- Aflatoxins	b- Mycorrhizal fungi	c- *Botrytis cinerea*
13	Red palm weevil killed by *Beauveria bassiana* appear:		
	a- White	b- Green	c- Black
14	Nematodes can be trapped and killed by some fungal species belonging to:		
	a- *Arthrobotrys*	b- *Ampelomyces*	c- *Pythium*
15	Copepod is the alternative host in the life cycle of:		
	a- Green bug	b- *Streptomyces*	c- *Coelomomyces*
16	Resting sporangia of *Coelomomyces* are derived from:		
	a- Sporothallus	b- Pycnidia	c- Ascomata
17	*Entomophaga maimaiga* exhibits high virulence against:		
	a- Endomycorhizae	b- Powdery mildews	c- Gypsy moth larvae
18	Villose conidia with hair-like appendages are diagnostic for identification of:		
	a- *Zoophthora radicans*	b- *Colletotrichum* sp.	c- *Conidiobolus coronatus*
19	*Smittium culisetae* is highly lethal to:		
	a- Aphids	b- Anopheles larvae	c- Arachnids
20	*Trichoderma harzianum* can be sprayed for protection of plants against:		
	a- *Hirsutella* infection	b- Anthracnose	c- *Sclerotinia* diseases

Q3: True (√)-False (X) Questions: **(15 marks)(15 questions)**

1. Methanogenic bacteria are highly sensitive to oxygen concentration in the system.	( )
2. *Azospirillum* live independently in soil or water without directly associating with plants.	( )
3. $Ca_2H_2(PO_4)_2 + H_2SO_4 \longrightarrow CaH_2(PO_4)_2 + CaSO_4$	( )
4. *Desulfovibrio desulfuricans,* the most important bacterium in the reduction of sulphate to hydrogen sulphide.	( )
5. Sulphate is the cation of a strong mineral acid (H_2SO_4) and prevents excessive alkalinity due to ammonia formation by soil microorganisms.	( )
6. Keratins can be easily degraded by commonly known proteolytic enzymes like trypsin, pepsin and papain.	( )
7. Bacteria, or fungi convert the organic nitrogen within the remains back into ammonium (NH_4^+).	( )
8. The beta-1,4 glycosidic bonds of cellulose can be breakdown by group of enzymes such as endogluconase, exogluconase and glucosidase.	( )
9. Through the process of mineralization, organic carbon, nitrogen, phosphorus, sulphur and iron are made available for reuse by plants	( )
10. Keratin is degradable by some species of symbiotic and parasitic fungi.	( )
11. The degradation of pectin has been extensively characterized in plant-pathogenic microbes such as yeasts.	( )
12. White-rot fungal cultures of *Trichoderma ressei* and *Trichoderma viride* used to study the production of chitinase.	( )
13. Hemicelluloses hydrolysis into soluble Hexoses and Pentoses by hemicellulases.	( )
14. Starch is converted into Oligosaccharides by *Bacillus acidopullulyticus* which produce Pullulanase.	( )
15. Chitinases in bacteria are shown to play a role in the digestion of chitin for utilization as a nitrogen and energy source and recycling chitin in nature.	( )

With My Best Wishes……..Prof. Dr. Nivien Allam Nafady

Assiut University Faculty of Science Botany& Microbiology Department	كلية العلوم جامعة أسيوط	Second Semester: January 2025 The time allowed: 2 hours. Total marks: 50 Marks Course Code: 491 B (Soil Microbiology)

Answer the following question (Q1, Q2 & Q3)

Q1: Write on the following: (choose only 5) (20 marks)(5 questions)

1. The biochemistry of biogas production.
2. Oxidation of organic Sulphur compounds.
3. Pathway of chitin degradation.
4. The microbiology and chemistry of phosphate solubilization.
5. Decomposition of cellulose.
6. Scope and importance of soil microbiology.
7. Decomposition of hemicellulose by microorganisms.

Q2: Complete the following statements: (15 marks)(9 questions)

1. Lignin degrading microorganisms can degrade lignin efficiently using a combination of ……
2. …… is important to water-holding capacity, water movement, and the amount and movement of soil air in a given soil.
3. The bacterial species *Clostridium thermocellum* and *Clostridium thermosaccharolyticum* represent promising candidates for cellulase production because they are ……, ……., and …….
4. Soil microbes produce variety of substances like ……. , ……, ……., which directly or indirectly promote the plant growth.
5. Rhizobia consist of a nitrogenase enzyme, which has the capability to combine …… with …… to form ammonia.
6. Nitrite-oxidizing bacteria convert …… into …….
7. …….. are known to degrade lignin at slow rates.
8. Pectin also known as ……., are rich in ……..
9. ……. allows the mushrooms to stand and still be flexible enough to sway without snapping.

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The second question:- (10 marks - 0.5 mark each)

Put (√) beside the correct answer and put (X) beside the wrong answer:-

1	Palynology is very interesting for its numerous number	( )
2	The study of pollen covers the field of pollen morphology and applied palynology	( )
3	Pollen grains of Gymnosperms & Angiosperms are also called as macrospores	( )
4	Spore mother cell produces 4 pollen grains	( )
5	If more than 4 pollen grains are adhering together, they are called polyads	( )
6	If 8, 12, 16, 24 or 32 pollen grains are adhering together, they are called pollinia	( )
7	Tetrastal us the part of pollen grain that faces opposite the center of tetrad during meiosis	( )
8	The pollen grain with distinct poles is called as isopolar	( )
9	Ratio between polar axis and maximum length of equatorial axis is called E/P ratio	( )
10	Pollen grains with fusiform or elongate aperatures are referred as colpate	( )
11	Pollen with apertures are scattered all over pollen wall, is called polar type	( )
12	Sexine is the layer that heterogeneous in structure & is acetolysis resistant	( )
13	Tegillum is the outermost layer of sporoderm and composed of large globular bodies	( )
14	Aacetolysis reagent is prepared from acetic acid anhydride and conc. sulfuric acid	( )
15	Sculpture of pollen grains is best detected using TEM	( )
16	Perforate is applied in palynology to holes less than 1 µm in diameter	( )
17	Baculate describing pollen with an ornamentation comprising spines longer than 1 µm	( )
18	The megasporangium of angiosperms on maturation gives rise to the fruit	( )
19	When funicle, chalaza & micropyle lie in the same vertical axis, ovule is called Atropous	( )
20	The transfer of pollen grains from the anthers of a flower to stigma of another flower borne by the same plant is known as cross-pollination	( )

The third question:- write short notes on each of the followings (30 marks)

a. Pollen units
b. Sporoderm stratification
c. Preparation of pollen grains for examination by light microscope.
d. Type of ovules
e. Bee pollination
f. Pollen and allergy

Best Wishes

Prof. Momen Zareh

Assiut University
Faculty of Science
Botany Department
Jun. 2025

Course code: 431B
Course: **Palynology**
2nd Semester – Final Exam
Time: 2 Hours

The first question:- (10 marks)

Choose the correct answer, put your answer in a table: - (0.5 mark each)

(1) **Palynology is the science, which deals with the study of .....**
a. pollen grains b. spores c. microfossils d. all of the precedings

(2) **Pollen walls made up of .....**
a. pollenien b. sporollenin c. grainopollen d. not of the precedings

(3) **The applied palynology study of many fields such as .....**
a. Criminology b. honeylogy c. cytology d. all of the precedings

(4) **Generally, a sporangium consists of .....**
a. sporangial wall b. tapetum layer c. spore mother cells d. all of the precedings

(5) **The anther of flowering plants consists of .....**
a. 4 sprangia b. 4 sporaginous sacs c. 4 pollen sacs d. all of the precedings

(6) **Dispersal unit of more than 4 pollen and fewer than the locular content is called .....**
a. pollinia b. massula c. tetrahedral d. none of the precedings

(7) **The type of pollen grains found only in *Asclepiadaceae* and *Orchidaceae* is called .....**
a. massula b. pollinia c. all planar d. polyads

(8) **The borderline of the distal and the proximal part of a pollen grain is called as .....**
a. bordistal b. polar c. proximal distal d. equator

(9) **The pollen with the two polar faces are different (one has aperture, other has not) is .....**
a. apolar b. polar c. isopolar d. heteropolar

(10) **According to Erdtman (1954), if the pollen is 100 - 200 µm, the class is called .....**
a. very small b. Medium-sized c. very large d. Gigantic

(11) **..... system describe the, position, character and number of aperatures**
a. NPC b. PCN c. CNP d. none of the precedings

(12) **The layer of pollen grain which is made up of numerous columellae called as .....**
a. intine b. ectoxine c. endoxine d. all of the precedings

(13) **The most widely technique used in palynological studies called as .....**
a. acetolysis b. acetoformine c. formalysis d. none of the precedings

(14) **The first stip of acetolysis is to boil flowering buds in 10% ..... in a water bath**
a. sodium hydroxide b. potassium hydroxide c. distilled water d. acetic acid

(15) **..... applied to wart-like sexine element, more than 1 µm wide and not constricted at base**
a. clavate b. verrucate c. gemmate d. granulate

(16) **..... is a reticulate ornamentation consisting of muri and lumina smaller than 1 µm**
a. clavate b. echinate c. bireticulate d. baculate

(17) **Entomophilly is the pollination by:-**
a. birds b. wind c. insects d. water

(18) **The branched or feathery style & stigma is adapted to:-**
a. entomophilly b. anemophily c. insectophily d. self-pollination

(19) **pollen with 3 or more apertures present around equatorial line, it is called .....**
a. polar type b. zono-aperture type c. panto-aperture type d. non of the precedings

(20) **..... applied to element of the sexine that constricted at its base and has same width as its height**
a. foveolate b. fossulate c. gemmate d. granulate