

Name:

Enrolment No:



UPES

End Semester Examination, December 2023

Course: Environmental and Agricultural Microbiology

Semester: III

Program: BSc Microbiology

Duration: 3 Hours

Course Code: HSMB 2023

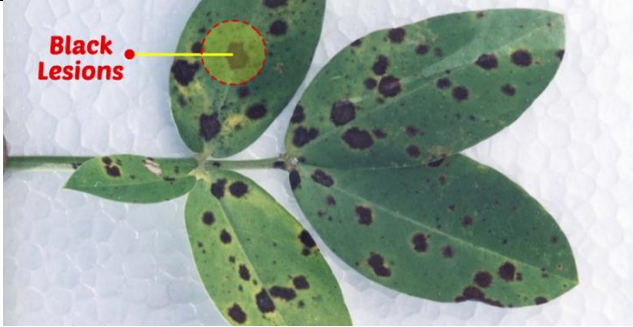
Max. Marks: 100

Instructions:

1. Read carefully and answer all the questions.
2. Draw neat labelled diagrams wherever necessary.
3. Do not scribble on question paper.

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	State True or False: Age of soil cannot be determined from soil horizons.	1.5	CO1
Q 2	What are biopesticides?	1.5	CO4
Q 3	Why does free living Rhizobia cannot fix Nitrogen?	1.5	CO2
Q 4	What is the difference between Plankton and Nekton?	1.5	CO1
Q 5	Name a water sampler with which you can collect water samples discretely from any depth.	1.5	CO1
Q 6	What is Actinorrhiza?	1.5	CO2
Q 7	The region where the soil and root make contact is designated as: a. Rhizosphere b. Lithosphere c. Hydrosphere d. Xerosphere	1.5	CO1
Q 8	The least energy-yielding step is: a. Nitrate Reduction b. Iron reduction c. Sulfate reduction d. Methanogenesis e. Acetate reduction	1.5	CO2

Q 9	State True or False: 'Dissimilatory' means a respiratory process which involves energy conservation via electron transport chain.	1.5	CO2
Q10.	The function of leghemoglobin is: a. Protection of Hydrogenase b. Protection of Oxygenase c. Protection of Nitrogenase d. All of the above	1.5	CO2
Q 11	Define thermocline and halocline.	1.5	CO1
Q 12	What is the term used to describe the process by which one microbe kills or inhibits the growth of another microbe? a. Antagonism b. Symbiosis c. Mutualism d. Commensalism	1.5	CO2
Q 13	What is Vermicompost?	1.5	CO4
Q 14	What is great plate count anomaly?	1.5	CO2
Q 15	Causative agent of Fire Blight disease affecting apples is: A. <i>Erwinia amylovora</i> B. <i>Xanthomonas spp.</i> C. <i>E coli</i> D. <i>Bacillus subtilis</i>	1.5	CO3
Q 16	Name the important primary producers of aquatic and marine ecosystems.	1.5	CO1
Q 17	The correct stoichiometric equation representing biological Nitrogen fixation is: A. $N_2 + 8H^+ + 8e^- + 16 ATP \rightarrow 2NH_3 + H_2 + 16ADP + 16 P_i$ B. $N_2 + 4H^+ + 4e^- + 8 ATP \rightarrow NH_3 + 1/2H_2 + 8ADP + 8 P_i$ C. $2N_2 + 12H^+ + 12e^- + 32 ATP \rightarrow 6NH_3 + H_2 + 34ADP + 34 P_i$ D. $N_2 + H^+ + e^- + 8 ATP \rightarrow NH_3 + H_2 + 8ADP + 8 P_i$	1.5	CO2
Q 18	What kind of soil is most suitable for growing cashew nuts: A. Black soil B. Red laterite soil C. Alluvial soil D. Clayey loam	1.5	CO1

Q 19	Identify sulfate reducing bacteria from below options: A. <i>Thiobacillus thiooxidans</i> B. <i>Desulfotomaculum</i> C. <i>Rhodospirillum</i> D. <i>Rhodomicrobium</i>	1.5	CO1
Q 20	What is biogas? State approximate composition of biogas.	1.5	CO4
Q1 Section B (4Qx5M=20 Marks)			
Q 1	Describe the different zonations of ocean with a diagram.	5	CO1
Q 2	Design an experiment to isolate and screen for efficient Phosphate solubilising microorganisms from soil.	5	CO2
Q 3	Write a short note on key microbial transformations during anaerobic degradation of organic matter for biogas production.	5	CO4
Q 4	a. What are hydrothermal vents? (1) b. Explain how microbial communities of hydrothermal vents support evolution of higher life forms. (4)	5	CO2
Section C (2Qx15M=30 Marks)			
Q 1	a. What are mycorrhizae. (2) b. Name the different types of mycorrhizae? (3) c. Explain the differences between ectomycorrhiza and endomycorrhiza with a diagram. (5) d. Discuss the importance of mycorrhizae for plant productivity and soil health in light of changing climate impacts. (5)	15	CO2
Q 2	 <p>a. Identify the plant disease and name the pathogen from above image. (2) b. Explain in details the symptoms and disease cycle. (10) c. Write a short note on control options of this pathogen. (3)</p>	15	CO3

Section D
(2Qx10M=20 Marks)

Q 1	a. What are GM crops? (2) b. Explain in details the mode of action of Bt toxin with a schematic diagram. (5) c. Discuss if Bt toxin can induce selection pressure among target pathogens? (3)	10	CO3
Q 2	Explain in details the biogeochemical cycling of Nitrogen with a neat diagram. Give examples of key genera/species during different microbial transformations of Nitrogen under oxic and anoxic conditions.	10	CO1