

Reg. No. _____



UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

**FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE,
AND BACHELOR OF SCIENCE (MICROBIOLOGY AND BIOTECHNOLOGY)**

SBT 418: MARINE MICROBIOLOGY

DATE: APRIL 6, 2018

TIME: 11:00 AM-1:00 PM

INSTRUCTIONS: Answer ALL Questions from SECTIONS A and B, and ONE Question selected from Section C.

SECTION A: Multiple Choice Questions (1 Mark each)

Please tick in the box opposite the correct answer.

1. Which of the following statements is false about surface-associated microorganisms ?
 - They play an important role in food web energetics.
 - They are vital for element cycling.
 - They are important in nutrient regeneration.
 - marine Rhodobacteraceae group are free living
2. Which of the statements is incorrect about natural bioactive products?
 - Their occurrence may be limited to a particular taxonomic family, genus, species or even organism.
 - They are often called secondary metabolites because they are biosynthesized by the general metabolic pathways.
 - They have no primary function directly involved in the normal growth, development or reproduction of an organism.
 - They are generally used by organisms to control ecological relationships.

3. Which of the statements is incorrect about biodeterioration?

- Biofouling which is in the form of deterioration occurs when the mere presence of an organism or its excrement renders the product unacceptable.
- Chemical assimilatory biodeterioration occurring when a material is degraded for its nutritive value.
- 'Material, the environment and the organisms' factors need to be taken into consideration to prevent biodeterioration.
- The control of the environment the most widely used method for enhancing biological deterioration.

4. Which of the following factors do not affect planktonic assemblages?

- Physical and chemical characteristics of water masses.
- The vertical structure of the water column.
- Nutrient and light levels.
- The horizontal structure of the water column.

5. Which of the following statements do not provide an explanation as to why marine fungi might have migrated from terrestrial environment?

- They belong to families and genera which have numerous terrestrial and aquatic counterparts.
- They do not show primitive characters.
- They are well adapted to marine environment.
- They are parasitic.

6. Which of the following organisms are not large contributors to primary production and phytoplankton biomass in marine environment?

- Synechococcus*.
- Prochlorococcus*.
- Filamentous fungi.
- Picophytoplankton.

7. Which of the following biogeochemical process is not involved in nitrogen cycle?
- Anaerobic ammonium oxidation.
 - Methanogenesis.
 - Denitrification.
 - Nitrification.
8. Which of the following statements is false about heavy oils, which result from the biodegradation of crude oil under anoxic conditions *in situ* in petroleum reservoirs?
- They have a much lower content of saturated hydrocarbons.
 - They have a much lower content of aromatic hydrocarbons.
 - They have a higher proportion of the more polar chemicals.
 - They have a lower proportion of the resins and asphaltenes.
9. Which of the following statements is false about marine bacteria?
- There are many identifiable fossil bacteria.
 - They are the chief microscopic organisms that assist chemical changes of a permanent character.
 - Some of them catalyse reactions at low temperatures.
 - Production of oil is possible due to actions of sulfate-reducers.
10. Which of the following statements is not a factor that has ensured marine microbe survival with little modification
- Their small size.
 - Their flexibility of metabolism.
 - Their large surface area-volume ratio.
 - Their large numbers.

11. Which of the following statements is false about microalgae derived bioactive ingredients?

- They produce a wide range of bioactive metabolites such as proteins, lipids, carbohydrates, carotenoids or vitamins that can be exploited for commercial use in food or cosmetic industry.
- Their extracts are incorporated in many face and skin care products.
- They are incorporated in anti-ageing products.
- They are used as fuels.

12. Which of the following statements is false about marine viruses?

- Phytoplankton blooms are most likely stopped by viruses.
- Viruses are critical in controlling blooms of harmful algae in coastal waters.
- Viral lysis of bacteria is a dominant form of bacterial mortality oligotrophic environments.
- The release of dissolved organic matter from cells lysed by viruses probably leads to higher growth rates for the surviving bacteria.

13. Which of the following statements is false about natural products from marine microbes?

- They lack propensity to interact with biological targets
- They have high chemical diversity
- They have biochemical specificity
- They have binding efficiency

14. Which of the following statements is false about quorum sensing?

- It plays a role in regulating initial microorganism surface interactions.
- It plays a role in microbial surface attachment.
- It plays a role in initiation of biofilm formation.
- It plays a role in consumption of autoinducers.

15. Which of the following statements is false about microbial chemotaxis?

- Chemotaxis is used by environmental bacteria to increase acquisition of organic substrates.
- Chemotaxis is used by environmental bacteria for enhanced uptake of inorganic nutrients.
- Many marine microorganisms are chemotactic.
- Chemotaxis toward marine particles has no effect on carbon cycling.

SECTION B: SHORT ANSWER QUESTIONS (5 Marks Each)

Your answers should be brief and to the point (Use the examination answer book provided)

16. Explain why it may be difficult to culture the most abundant marine bacteria.

17. Outline the factors to be considered while studying marine microorganisms.

18. Describe towed nets as a primary means of collecting planktons.

19. Explain how a marine microbiologist can carry out an inquiry that can lead to advances in biogeochemistry.

20. Discuss crude oil degrading microorganisms in marine environment.

21. Describe bacterial deterioration.

SECTION C: ESSAY QUESTIONS (25 Marks Each)

Write an essay on any ONE of the following topics (Use the examination answer book provided)

22. Give a detailed account of marine heterotrophic protists.

23. Explain how surface association is physiologically advantageous to marine microbes.

24. Discuss major challenges that are likely to be encountered during marine bioactive product development.

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