

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2022**

(CBCSS)

Biology

BIO 2C 06—ECOLOGY AND EVOLUTION

(2020 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A (Short Answer Type Questions)

Answer any four questions.

Each question carries 2 weightage.

1. Give a short note on ex-situ conservation.
2. What is Phylogenetics ?
3. Comment on aggression.
4. Give a brief note on species richness.
5. Give note on disruptive selection.
6. What is kin selection ?
7. Comment on the contributions of Alfred Russel Wallace.

(4 × 2 = 8 weightage)

Turn over

Section B (Short Essay Type Questions)

Answer any four questions.

Each question carries 3 weightage.

8. Give note on Bioremediation.
9. Explain biological species concept.
10. Write short note on animal signaling.
11. What is genetic drift ? How it affects fitness of the population.
12. What is habitat loss and degradation? How it affects local biodiversity.
13. Give a brief note on molecular clocks with examples.
14. What is island biogeography ? Give note on the evolution at islands.

(4 × 3 = 12 weightage)

Section C (Long Essay Type Questions)

Answer any two questions.

Each question carries 5 weightage.

15. What is molecular systematics ? Differentiate between cladistics and phenetics.
16. Write an essay on various population interactions in a community.
17. What are Biomes ? Give a detailed note on the major terrestrial biomes.
18. Write an essay on the process of evolution without natural selection event.

(2 × 5 = 10 weightage)

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Biology

BIO 2C 05—BIOPHYSICS

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Time : Three Hours

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I. Answer any *four* of the following (Short Answer type questions) (Weightage 2) :

1. What are nanoparticles ? Add a note on their importance in healthcare.
2. Explain FRAP. How it is useful in Fluorescence microscopy ?
3. What is meant by Pulse chase experiment ? Explain with an example.
4. Explain how the method of Isoelectric focussing is useful in the separation of Proteins.
5. Gibb's Donnan equilibrium.
6. Give an outline of theories on pitch perception.
7. Explain Ultrafiltration. Add a note on its role in purification of blood.

(4 × 2 = 8 weightage)

II. Answer any *four* of the following (Short essay type questions) (Weightage 3) :

8. Define pH. What are the ways by which pH is measured?
9. Briefly explain the importance of Diffusion and Osmosis in Cellular metabolism.

- 10 Explain how the ear is receiving and analysing echoes.
- 11 Briefly outline the method of Density gradient centrifugation.
- 12 Explain how Electrophoresis is done to separate components from DNA mixture.
- 13 Design and applications of GM Counter.
- 14 Give an outline of Phase contrast Microscopy.

(4 × 3 = 12 weightage)

III. Answer any *two* of the following (Long essay type questions) (Weightage 5) :

- 15 Explain the methods used for the preparation of specimens for Electron Microscopy.
- 16 Explain how NMR spectroscopy is used for the structural analysis of molecules.
- 17 Give an outline of Flow Cytometry.
- 18 Explain how 2D PAGE is performed. What are the advantages of 2D PAGE over PAGE.

(2 × 5 = 10 weightage)

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Biology

BIO 2C 04—MICROBIOLOGY

(2020 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

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I. Answer any *four* of the following (Short Answer type questions) (Weightage-2) :

- 1 What are preservatives ? Explain with examples.
- 2 What is Cyclic photophosphorylation ?
- 3 Describe IMViC.
- 4 What is meant by motility of bacteria ? Add a note on its types.
- 5 Explain submerged fermentation.
- 6 Explain nutritional types of bacteria.
- 7 Write in detail on transposons.

(4 × 2 = 8 weightage)

II. Answer any *four* of the following (Short essay type questions) (Weightage 3) :

- 8 Briefly explain the production of alcohol ?
- 9 Outline the various methods used in microbiological analysis of drinking water ?
- 10 Write in detail about food spoilage.
- 11 Explain ultrastructure of Bacteriophage.
- 12 What is normal flora and explain human -microbe interaction ?
- 13 Explain bacterial conjugation.
- 14 Write a short essay on plasma membrane.

(4 × 3 = 12 weightage)

III. Answer any *two* of the following (Long essay type questions) (Weightage 5) :

- 15 Express in detail phylogenetic and numerical taxonomy of Bacteria.
- 16 Explain the structure of Bacterial cell wall.
- 17 Explain human diseases caused by viruses.
- 18 Briefly explain methods of cultivation of bacteria.

(2 × 5 = 10 weightage)

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Section A (Short Answer Type Questions)

*Answer any **four** questions.*

1. What is primary productivity ?
2. Comment on the contributions of Lamarck.
3. What are Invasive species ? How they affect local communities ?
4. What is the importance of metapopulation on survival of large mammals ?
5. Give note on the spontaneous generation theory.
6. Comment on neutral theory of evolution.
7. What are keystone species ? Give examples.

(4 × 2 = 8 weightage)

Turn over

Section B (Short Essay Type Questions)

Answer any four questions.

8. Write a brief note on species area relationships.
9. What is phylogenetics ? Explain the methods for phylogenetic reconstruction of organisms.
10. Give a brief note on global climate change and the factors that accelerates it.
11. Write briefly different macroevolutionary patterns or process that shape evolution.
12. Give a short essay on predator-prey interactions.
13. What is Species concepts ? Comment on speciation.
14. How do we measure bio-diversity ? Write different approaches of measurement.

(4 × 3 = 12 weightage)

Section C (Long Essay Type Questions)

Answer any two questions.

15. What are molecular clocks ? How are they useful in estimating Species Divergence ?
16. What is Bio-diversity ? Explain different types and value of biodiversity.
17. Describe in detail the types and methods of conservation.
18. Give an essay on evidence for natural selection and evolution.

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Part A

I. Answer any *four* of the following. Short Answer Type Questions. Weightage 2 :

- 1 List out the differences between light microscope and Electron microscope.
- 2 Write the importance of Coomassie Brilliant Blue and Bromophenol Blue in PAGE.
- 3 Write a brief note on Chromatography.
- 4 Write a note on importance of LASER in flowcytometry.
- 5 Explain Liquid Scintillation Counter.
- 6 Give an outline of Density gradient centrifugation.
- 7 Write a note on importance of buffers in living systems.

(4 × 2 = 8 weightage)

Part B

II. Answer any *four* of the following. Short Essay Type Questions. Weightage 3 :

- 8 Outline the physical basis of hearing.
- 9 Briefly explain the process of Electrophoresis.
- 10 Explain principle of autoradiography. Add a note on methods and applications.
- 11 Explain principle and procedure for column chromatography.
- 12 Explain how Centrifugation is useful to separate components from mixture.
- 13 Design and applications of GM Counter.
- 14 Give an outline of FRET Microscopy.

(4 × 3 = 12 weightage)

Part C

III. Answer any *two* of the following. Long Essay Type Questions. Weightage 5 :

- 15 Explain how pH of a buffer is determined by Henderson Hasselbalch equation.
- 16 Explain how X-rays are used for the structural analysis of crystals.
- 17 Give an outline of Electron microscopy and its types.
- 18 Explain how nanotechnology is used for environmental management.

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Biology

BIO 2C 04—MICROBIOLOGY

(2019 Admission onwards)

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Part A

I. Answer any *four* of the following (Short Answer type questions) (Weightage 2) :

- 1 Explain ribotyping.
- 2 What are Plasmids ? Explain their role in bacteria.
- 3 Explain the structure of bacterial cell wall.
- 4 Explain the stages of growth curve.
- 5 Describe any method used for preservation of food.
- 6 What are antibiotics ? Add a note on its mechanism of action.
- 7 Explain any human disease caused by bacteria.

(4 × 2 = 8 weightage)

II. Answer any *four* of the following (Short essay type questions) (Weightage 3) :

- 8 Briefly explain how the structure of Bacterial flagella helps in Locomotion.
- 9 Explain the types of plant microbe interactions.
- 10 Write in detail on Antibiotic sensitivity Test and drug resistance.
- 11 Outline the physical methods of sterilization.
- 12 Explain Bacterial photosynthesis.
- 13 Explain phylogenetic classification of bacteria.
- 14 Write a short note on Bioremediation.

(4 × 3 = 12 weightage)

III. Answer any *two* of the following (Long essay type questions) (Weightage 5) :

- 15 Give an outline of ultrastructure of virus and their replication mechanism.
- 16 Explain the mechanisms of gene transfer found in bacteria.
- 17 Give an outline of microbiological analysis of drinking water.
- 18 What are disinfectants ? Add a note on types of disinfectants and their mode of action.

(2 × 5 = 10 weightage)