

2024

**ZOOLOGY**

(Major)

ZOOL-MAJ-3014

**PRINCIPLES OF ECOLOGY**

**Total Marks : 60**

**Time : 2½ Hours**

*Total number of printed pages - 3*

*The figures in the margin indicate full marks for the questions*

1. Choose the correct answer from the following questions :  $1 \times 7 = 7$
- (a) Who gave the terms "Autecology" and "Synecology"?
- (i) A. G. Tansley                      (ii) Karl Mobius  
(ii) Schooter and Kirchner        (iv) A. V. Humboldt
- (b) What is the major limiting factor for photosynthesis?
- (i) CO<sub>2</sub>                                      (ii) Water  
(iii) Sunlight                              (iv) Chlorophyll
- (c) Which of the following trait set characterizes best a "r" selected species?
- (i) Usually a type III survivorship curve, short life span and density dependent mortality  
(ii) Usually a type I survivorship curve, short life span and density dependent mortality  
(iii) Usually, a type I survivorship curve, long life span and density independent mortality

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- (iv) Usually a type III survivorship curve, short life span and density independent mortality
- (d) Ecotone is :
- (i) The bottom of a lake
  - (ii) A zone of transition between Two communities
  - (iii) A polluted area
  - (iv) A zone of developing community
- (e) In grassland ecosystem, pyramid of energy is .....
- (i) Inverted
  - (ii) Upright
  - (iii) Mixed
  - (iv) None of the above
- (f) Which of these refers to the ecological succession on sand?
- (i) Xerosere
  - (ii) Psammosere
  - (iii) Hydrosere
  - (iv) Halosere
- (g) Which enzymes are crucial in nitrogen fixation?
- (i) Nitrogenase and hydrogenase
  - (ii) Nitrogenase and hexokinase
  - (iii) Nitrogenase and peptidase
  - (iv) Nitrogenase and hydrolyase
2. Answer the following questions in brief : 2×4=8
- (a) Define the law of limiting factors.
  - (b) What do you mean by ecological natality?
  - (c) What is mono climax theory?
  - (d) Define the ecotone and edge effect.
3. Answer any three of the following questions : 5×3=15
- (a) Write short notes : 2½+2½=5

- (i) r and k strategies
- (ii) y shaped food chain
- (b) Explain the energy flow in an ecosystem with a suitable diagram. 5
- (c) What are different types of survivorship curves? Explain. 5
- (d) Describe the major theories of climax community. 5
- (e) Write the differences between the following :  $2\frac{1}{2}+2\frac{1}{2}=5$ 
  - (i) Type I survivorship curve and type II survivorship curve
  - (ii) Biotic and abiotic in ecology factors.
- 4. Answer any three of the following questions :  $10\times 3=30$ 
  - (a) Define the term "Population attributes". What are the attributes shown by population but not by individual species. Explain.  $2+8=10$
  - (b) Define succession. What do you mean by primary and secondary succession with suitable example?  $2+8=10$
  - (c) What is community explain the different characteristics of community in ecology.  $2+8=10$
  - (d) What do you mean by Ecological efficiency? Explain with a suitable diagram. 10
  - (e) Explain the nitrogen cycle with suitable diagram. 10



- (d) Which of the following structures are involved in the formation of cilia and flagella?
- (i) Actin filaments
  - (ii) Microtubules
  - (iii) Intermediate filaments
  - (iv) Lamin
- (e) Which process occurs in the mitochondrial matrix?
- (i) Electron transport chain
  - (ii) Glycolysis
  - (iii) Krebs cycle
  - (iv) Photosynthesis
- (f) During which phase does the nuclear envelope break down?
- (i) Metaphase
  - (ii) Prophase
  - (iii) Anaphase
  - (iv) Telophase
- (g) What is the primary function of peroxisomes?
- (i) ATP production
  - (ii) Lipid metabolism
  - (iii) Protein synthesis
  - (iv) Photosynthesis
2. Answer the following questions in brief : 2×4=8
- (a) What types of diseases are associated with mycoplasma infections in humans? Provide examples.
  - (b) Write briefly on ribosomes.
  - (c) Name two lysosomal enzymes.
  - (d) Write two functions of actin filament.
3. Answer any three of the following questions : 5×3=15
- (a) What are the differences between viroids and viruses?
  - (b) Write the key functions of lysosomes.
  - (c) What are the characteristics of rough endoplasmic reticulum?
  - (d) Differentiate between euchromatin and heterochromatin.

- (e) Compare mitotic and meiotic cell division.
4. Answer any three of the following questions :  $10 \times 3 = 30$
- (a) Discuss different types of cell junctions found in animal tissues, highlighting their structure, function, significance and examples.  $10$
- (b) What is membrane transport? Discuss different transport mechanisms across plasmamembrane with suitable example. Explain their significance in cellular function.  $2+6+2=10$
- (c) Discuss the structure and function of Golgi apparatus with suitable diagram.  $4+4+2=10$
- (d) What is mitotic apparatus? Discuss the structure and function of mitotic apparatus with suitable diagram.  $2+4+4=10$
- (e) Describe how ATP synthesis occurs in mitochondria and the role of the chemiosmotic gradient.  $7+3=10$

2024

**ZOOLOGY**

(MINOR)

ZOOL-MIN-3014

**PRINCIPLES OF ECOLOGY**

**Total Marks : 60**

**Time : 2½ Hours**

*Total number of printed pages - 5*

*The figures in the margin indicate full marks for the questions*

1. Choose the correct answer from the following questions :  $1 \times 7 = 7$

তলত দিয়া প্ৰশ্নবোৰৰ শুদ্ধ উত্তৰটো বাছি উলিওৱা :

(a) Who is often referred to as the father of ecology?

বাস্তৱ্য বিদ্যা বিষয়টোৰ জনক বুলি কাক কোৱা হয় ?

(i) Charles Darwin (চাৰ্লছ ডাৰউইন)

(ii) Ernst Haeckel (আৰ্নষ্ট হেকেল)

(iii) Carl Linnaeus (কাৰ্ল লিনিয়াছ)

(iv) Gregor Mendel (গ্ৰেগৰ মেণ্ডেল)

(b) Which physical factor is directly involved in the photosynthesis process in plants?

কোনটো ভৌতিক কাৰক উদ্ভিদৰ সালোকসংশ্লেষণ প্ৰক্ৰিয়াৰ সৈতে প্ৰত্যক্ষভাৱে জড়িত ?

(i) Carbondioxide (কাৰ্বনডাইঅক্সাইড)

(ii) Wind (বায়ু)

(iii) Soil nutrient (মাটিৰ পুষ্টিকৰ উপাদান)

(iv) Nitrogen (নাইট্ৰজেন)

(c) Which of the following factors can affect population size?

তলৰ কোনটো কাৰকে জনসংখ্যাৰ আকাৰত প্ৰভাৱ পেলাব পাৰে?

- (i) Birth rate (জন্মৰ হাৰ)
- (ii) Death rate (মৃত্যুৰ হাৰ)
- (iii) Immigration and emigration (অনুপ্ৰবেশ আৰু প্ৰব্ৰজন)
- (iv) All of the above (ওপৰৰ সকলোবোৰ)

(d) What type of growth does a population exhibit when resources are unlimited?

সম্পদ সীমাহীন হ'লে জনসংখ্যাই কি ধৰণৰ বৃদ্ধি প্ৰদৰ্শন কৰে?

- (i) Logistic growth (লঘুগণকীয় বৃদ্ধি)
- (ii) Exponential growth (সূচকীয় বৃদ্ধি)
- (iii) Linear growth (ৰৈখিক বৃদ্ধি)
- (iv) Cyclic growth (চক্ৰীয় বৃদ্ধি)

(e) Which of the following is a pioneer species?

তলৰ কোনটো প্ৰাৰম্ভিক সম্প্ৰদায়?

- (i) Oak tree (ওক গছ)
- (ii) Grass (ঘাঁহ)
- (iii) Lichen (লাইকেন)
- (iv) Deer (হৰিণা)

(f) What are the main two components of an ecosystem?

পৰিবেশ তন্ত্ৰৰ মূল উপাদান দুটা কি কি?

- (i) Biotic and abiotic factors (জৈৱিক আৰু অজৈৱিক কাৰক)
- (ii) Primary and secondary consumer  
(প্ৰাথমিক উপভোক্তা আৰু দ্বিতীয় স্তৰৰ উপভোক্তা)
- (iii) Producer and decomposer (উৎপাদক আৰু বিয়োজক)
- (iv) Plants and animals (উদ্ভিদ আৰু প্ৰাণী)

(g) Which of the following factors can influence species richness in a community?

তলৰ কোনটো কাৰকে এটা সম্প্ৰদায়ত প্ৰজাতিৰ সমৃদ্ধিৰ ওপৰত প্ৰভাৱ বিস্তাৰ কৰে?

- (i) Habitat size (বাসস্থানৰ আকাৰ)
- (ii) Climate condition (জলবায়ুৰ অৱস্থা)
- (iii) Resource availability (সম্পদ উপলব্ধতা)
- (iv) All of the above (ওপৰৰ সকলোবোৰ)

2. Answer the following question in brief: 2×4=8

তলৰ প্ৰশ্নবোৰৰ চমু উত্তৰ লিখা :

(a) What is the significance of decomposer in an ecosystem? 2  
পৰিৱেশ তন্ত্ৰত বিয়োজকৰ তাৎপৰ্য কি?

(b) What is keystone species in a community? Write its significance and provide an example. 1+1=2

এটা সম্প্ৰদায়ৰ কীষ্টোন প্ৰজাতি কি? ইয়াৰ তাৎপৰ্য লিখা আৰু এটা উদাহৰণ দিয়া।

(c) Define a population in ecological terms and explain how it differs from a community. 1+1=2

জনসংখ্যাৰ সংজ্ঞা লিখা আৰু ই এটা সম্প্ৰদায়ৰ পৰা কেনেকৈ পৃথক সেই বিষয়ে ব্যাখ্যা কৰা।

(d) Differentiate between unitary and modular populations. 2  
একক আৰু মডিউলাৰ জনসংখ্যাৰ মাজত পাৰ্থক্য লিখা।

3. Answer any three of the following questions : 5×3=15

তলৰ যিকোনো তিনিটা প্ৰশ্নৰ উত্তৰ লিখা :

(a) Discuss the law of limiting factors and its significance in ecology. 5

সীমিত কাৰকৰ নিয়ম আৰু পৰিৱেশ বিজ্ঞানত ইয়াৰ তাৎপৰ্য বিষয়ে আলোচনা কৰা।

- (b) Discuss the differences between density dependent and density independent factors affecting population growth, provide examples of each. 5

জনসংখ্যা বৃদ্ধিত প্ৰভাৱ পেলেৱা ঘনত্ব নিৰ্ভৰশীল আৰু ঘনত্ব স্বাধীন কাৰকৰ মাজৰ পাৰ্থক্যৰ বিষয়ে আলোচনা কৰি, প্ৰত্যেকৰে উদাহৰণ দিয়া।

- (c) Write short notes on age ratio and sex ratio.  $2\frac{1}{2}+2\frac{1}{2}=5$   
বয়সৰ অনুপাত আৰু লিংগ অনুপাতৰ ওপৰত চমুটোকা লিখা।

- (d) What is food web? Differentiate between Detritus and grazing food chain with example.  $1+4=5$

খাদ্য জাল কি? মৃতভোজী আৰু চৰণীয়া খাদ্য শৃংখলৰ মাজত থকা পাৰ্থক্য উদাহৰণসহ ব্যাখ্যা কৰা।

- (e) What is ecological niche? Write a note on ecotone and edge effect.  $1+4=5$

ইক'ল'জিকেল নিচ কি? ইক'টন আৰু প্ৰান্তীয় প্ৰভাৱৰ ওপৰত এটা টোকা লিখা।

4. Answer any three of the following questions :  $10 \times 3 = 30$

তলৰ যিকোনো তিনিটা প্ৰশ্নৰ উত্তৰ লিখা :

- (a) What is a climax community? Discuss the mechanism of ecological succession and their importance in ecosystem with a suitable example.  $2+8=10$

চৰম সম্প্ৰদায় কি? ইক'ল'জিকেল অনুক্ৰম ব্যৱস্থাটো আৰু পৰিৱেশতন্ত্ৰত ইয়াৰ গুৰুত্বৰ বিষয়ে উপযুক্ত উদাহৰণসহ আলোচনা কৰা।

- (b) What is biogeochemical cycle? Explain the Nitrogen cycle and their importance in ecosystem.  $1+7+2=10$

জৈৱ ভূ-ৰাসায়নিক চক্ৰ কি? নাইট্ৰজেন চক্ৰ আৰু পৰিৱেশ তন্ত্ৰত ইয়াৰ গুৰুত্ব ব্যাখ্যা কৰা।

- (c) Describe the concept of ecological pyramid and its types with example. 2+8=10

ইক'ল'জিকেল পিৰামিডৰ ধাৰণা আৰু ইয়াৰ প্ৰকাৰসমূহ উদাহৰণৰ সৈতে বৰ্ণনা কৰা।

- (d) What is 'r' and 'K' strategies? Discuss the Lotka-Volterra equation for competition and predation. 4+6=10

'r' আৰু 'K' কৌশল কি? প্ৰতিযোগিতা আৰু পৰভক্ষিতা প্ৰক্ৰিয়াত লটকা ভলটেৰা সমীকৰণৰ বিষয়ে বিস্তৃত আলোচনা কৰা।

- (e) What is Gousses principle? Describe about logistic and exponential growth pattern of population along with various phase and significance. 2+8=10

গাউছৰ নীতি কি? জনসংখ্যাৰ লঘুগণকীয় আৰু সূচকীয় বৃদ্ধিৰ ধৰণ, লগতে ইয়াৰ বিভিন্ন পৰ্যায় আৰু তাৎপৰ্য্যৰ বিষয়ে বৰ্ণনা কৰা।