ZOOLOGY

Semester-III

Core-V **Principles of Ecology**

Programme Outcome:

- Understand the concept of an ecosystem, its attributes, factors and functioning.
- Learn about population attributes, growth patterns, strategies; regulation and interactions.
- To appraise learners regarding various community characteristics.
- Comprehend biological data, learn graphical representation of data, sampling techniques, grasp basic statistics.
- Acquire skills on plotting survivorship curves, quadrate method of determining population density, diversity indices, techniques of preservation and mounting of plankton, determination of ecological parameters.

Course Outcome:

- Utilize information to understand interrelations and working of an ecosystem.
- Demonstrate the ability to comprehend data, plot graphs, present data and apply basic statistics.

Learning Outcome:

- Understand food chain dynamics and energy flow patterns.
- Gain knowledge about population dynamics.
- Understand community stratification and succession.
- Gain knowledge about representation of data, data processing and analysis.

Unit 1: Ecosystem and Applied Ecology

Ecology: Autecology and synecology, Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids Nutrient and biogeochemical cycle with one example of Nitrogen cycle. Laws of limiting factors, Study of physical factors- (Light, temperature).

Unit 2: Population

Attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies. Population regulation - density-dependent and independent factors, Population interactions, Gause's Principle with laboratory and field examples.

Unit 3: Community

Community characteristics: species richness, dominance, diversity, abundance,vertical stratification, Ecotone and edge effect; Ecological succession with one example. Theories pertaining to climax community.

Unit – 4: Biometry

Biological data, graphical representation of data (frequency polygon and histogram), sampling techniques, measures of central tendency (Mean, median and mode), Measures of dispersion (range, quartile deviation, mean deviation and standard deviation), Hypothesis and hypothesis testing (Chi-square test, t- test).

Text Book:

- ✓ *Odum, E.P. and Barrett, G.W., (2018). Fundamentals of Ecology, 5th Edition*
- ✓ *Smith and Smith, Elements of Ecology, Global Edition; Pearson Education India; ninth edition (14 May 2015).*
- ✓ *Myra Samuels, J. Witmer,A. Schaffner, Statistics for the life sciences, Prentice Halls, Boston, 4th edition, 2012.*

Suggested Readings:

- ✓ *Kormondy, (2017). Concepts of Ecology, Updated 4/e, Pearson.*
- ✓ *Colinvaux, P. A. (1993). Ecology. II Edition. Wiley, John and Sons, Inc. Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.*
- ✓ *Ricklefs, R.E., (2000). Ecology. 5th Edition. Chiron Press.*
- ✓ *Dash M.C., Fundamentals of Ecology. Mc GrawHill*
- ✓ *Smith TM and Smith RL, Elements of Ecology, 8th Edition,Pearson education INC, USA*
- ✓ *Miller, G.T. and Spoolman, S.E. (2017) Environmental Science, 14th Edition. Cengage Publication, New Delhi.*
- ✓ *Odum, E.P. and Barrett, G.W., (2018). Fundamentals of Ecology, 5th Edition.*
- ✓ *Cengage Publication, New Delhi*
- ✓ *Web site: https://www.cbd.int/*
- ✓ *Baneerjee Pranab Kumar, Introduction to biostatistics, S Chand & Company; 3rd Rev. Edn. 2006 edition*
- ✓ *Chainy GBN, Mishra G, MohantyPK, 2004, Basic Biostatistics, Kalyani Publisher.*

PRACTICAL

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton collection, preservation and mounting, Measurement of temperature, turbidity/penetration of light, determination of pH, Dissolved Oxygen content (Winkler's method), BOD, COD, Free CO_2, Hardness, TDS.
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary.
5. Chi-square analysis using seeds/beads/Drosophila.
6. Problems on standard deviation.
7. Graphical representation of data (Frequency polygon and Histogram).

Suggested Reading:

- ✓ *Practical Ecology by David Slingsby, Ceridwen Cook, Red Globe Press London.*
- ✓ *Practical Methods in Ecology by Henderson Peter A. John Wiley and Sons Ltd.*
- ✓ *Practical Ecology by Rao K S, K.S. Rao. Anmol Publications.*