

**JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

Programme: B.Sc.

Semester: V

ZOOLOGY PAPER VI

CELL BIOLOGY, IMMUNOLOGY AND ENVIRONMENTAL BIOLOGY

Course Code: 18VZO6

No. of Hours: 45

COURSE OBJECTIVES: To understand the basic concepts of:

- Cell regulation, cell differentiation, immune system and cancer
- Man and environment
- Biodiversity Conservation
- To provide practical skills on cytological techniques and enable the students to relate their knowledge to situations in their surrounding environment

LEARNING OUTCOMES:

- The students obtain the skill of identifying different stages of cell division
- They get an understanding of the types of immune responses and effect of cancer and its treatment
- They attain a basic understanding on the anthropogenic effect on the environment and how these environmental issues can be mitigated and the urgent need to conserve the biodiversity for the survival of mankind

UNIT I: CELL BIOLOGY

10 HRS

1. Microscopy- Principles of light, phase contrast and electron microscopes **2 HRS**
2. Ultra structure of plasma membrane – Singer and Nicholson model, Chemical composition and functions of plasma membrane, Cell –cell interaction –micro villi, desmosomes, gap junction and tight junctions **4 HRS**
3. Fertilization: Definition, physical, chemical and cortical changes during fertilization, Methods to prevent polyspermy (slow block and fast block) **2 HRS**
4. Parthenogenesis: Definition, Natural - Arrhenotoky, Thelytoky, Amphitoky and cyclical with suitable examples. Artificial Parthenogenesis. **2 HRS**

UNIT II: BIOLOGY OF CANCER

05 HRS

1. Definition, General properties of cancer cells, Oncogens, structural and metabolic variations in cancer cells, prevention and treatment - Surgery, Chemotherapy, Radiotherapy, Laser therapy, Gene therapy and targeted therapy.

UNIT III: IMMUNOLOGY

08 HRS

1. Defense against diseases: Introduction, antigen and antibodies. Role of B and T lymphocytes and primary and secondary immune response **2 HRS**
2. Production of monoclonal and polyclonal antibodies **2 HRS**
3. Immunization, hypersensitivity, allergy (Types, causes and reactions) and auto-immune diseases, Transplantation of Organ: Types, graft rejection, immuno-suppressors, keratoplasty, plastic surgery. **2 HRS**

4. Stem cells and organ culture- Introduction to organ culture, First and second sets of reactions, Ethical issues **2 HRS**

ENVIRONMENTAL BIOLOGY

UNIT IV: PRINCIPLES OF ECOLOGY 11 HRS

1. Introduction, sub-divisions and scope of ecology **1 HR**
2. Concepts of Habitat and Niche, Habitat: Definition, Microhabitat and Macro-habitat, Niche: Definition and types - Spatial, Trophic and Multidimensional **3 HRS**
Abiotic factors: Principles of limiting factors, Liebig's law of minimum, Shelford's law of tolerance and Combinedlaw concept **2 HRS**
3. Ecological factors: Temperature - Thermal stratification, Range of tolerance, Poikilothermy and Homeothermy. Light - Distribution, Ecological effects, Photoperiodism and Bioluminescence. **3 HRS**
4. Energy flow in the ecosystem: Concept of productivity, Laws of thermodynamics. **2 HRS**

UNIT V: ANIMAL POPULATION AND COMMUNITY 04 HRS

1. Population Ecology: Population density, Natality, Mortality, Biotic potential, Population growth, Population fluctuation, population oscillation and dispersal, Human population explosion **2 HRS**
2. Community Ecology: Intra and inter-specific interactions - Neutral (neutralism), positive (mutualism, proto co-operation and commensalism), and negative (antibiosis, exploitation and competition) **2 HRS**

UNIT VI: POLLUTION AND BIODIVERSITY CONSERVATION 07 HRS

1. Pollution: Definition, types – water and air pollution with reference to organic, industrial, thermal and radioactive pollutants.- causes and effects, Anthropogenic activity generated radiation and its effects, Ecological indicators of pollution. **2 HRS**
2. Toxicology: Definition, toxicants of public health hazards. Xenobiotics, Bioremediation, Phytoremediation, Synergism , Antagonism and Biomagnification. **2 HRS**
Biodiversity conservation and its management: Red data book and endangered species. Major Biodiversity hot spots, Wild life sanctuaries and National parks of India. Major organizations involved in wild life conservation. Chipko movement, Appiko movement and joint forest management (JFM) **3 HRS**

PRACTICAL VI
CELL BIOLOGY AND ECOLOGY

DURATION: 3-HRS/UNIT

NO. OF UNITS: 15

CELL BIOLOGY:

1. Squash preparation: Grass hopper testis for meiosis stages.
2. Micrometry. **4 UNITS**

ECOLOGY:

Analysis of water samples: **4 UNITS**

1. Estimation of salinity
2. Estimation of dissolved oxygen
3. Estimation of organic matter
4. Analysis of soil samples
5. Estimation of total, permanent and temporary hardness of water by EDTA-method

ECOLOGICAL ADAPTATIONS **5 UNITS**

Ecological adaptations in the following examples

- Tubicolous Worms: Chaetopterus, Sabella
- Burrowing Forms: Dentalium, Balanoglossus
- Sedentary Forms: Balanus, Ascidian
- Passive flight adaptation: Exocoetus, Draco

Animal associations:

- Colonial Forms: Physalia, Termites
- Mutualism: Sea anemone and hermit crab
- Parasitism: Tapeworm, Sacculina on crab
- Camouflage: Stick insect, Leaf insect and Chameleon

Practical tests/repetition

2 UNITS

Note: 13 Practicals + 2 units for practical tests/repetition

REFERENCES:

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4. **GUPTA P.K.** 2003. CELL AND MOLECULAR BIOLOGY, Rastogi Publications, Meerut, 2nd Ed.
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ECOLOGY:

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13. **COLINVAUX.** 1986. ECOLOGY, John Wiley and Sons Publications, New York.
14. **KREBS C.J.** 1989.ECOLOGY, Harper and Row Publications.
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17. **RICHARD H. Wagner.** 1971. ENVIRONMENT AND MAN, W.W. Norton and Company, New York
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19. **SMITH R.L.** 1966.ECOLOGY AND FIELD BIOLOGY, Harper and Row Publications, New York.
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