

## PAPER-V TECHNIQUES AND TOOLS FOR BIOLOGY AND ENVIRONMENTAL PHYSIOLOGY

(Questions will be set from each unit)

### UNIT-I Tools and Techniques - I

1. **Principles and uses of analytical instruments** : A. Colorimeter. B. Spectrophotometer. C. Ultracentrifuge. D. Densitometric Scanner. E. Differential Scanning Colorimeter. F. ESR and NMR Spectrometers. G. Microtomy.
2. **Microscopy** : Principle of light transmission, electron, Phase - Contrast, Confocal microscopes.
3. **Microbiological techniques** : A. Media preparation and sterilization. B. Inoculation and growth monitoring. C. Use of fermentors. D. Microbial assays.
4. **Cell Culture Techniques** : A. Design and functioning of tissue culture laboratory. B. Cell proliferation measurements. C. Cell Viability testing. D. Culture media preparation and cell harvesting methods.
5. **Cryotechniques** : A. Cryopreservation cells, tissues, organisms. B. Cryotechniques for microscopy.

### UNIT-II Tools and Techniques - II

1. Separation techniques in biology : A. Molecular separation by chromatography. Electrophoresis, precipitation etc. B. Organelle separation by centrifugation.
2. Computer aided techniques for data presentation data analyses, statistical techniques.
3. Radioisotope and mass isotope techniques in biology -  
A. Sample preparation for radioactive counting. B. Autoradiography.
4. Immunological techniques based on antigen - antibody interactions.
5. Surgical techniques : A. Organ ablations. B. Perfusion techniques. C. Indwelling catheters. D. Stereotaxy. E. Parabiosis. F. Biosensors.

### UNIT-III Environmental Physiology - I

1. Adaptation : A. Levels of adaptation. B. Mechanism of adaptation. C. Significance of Body Size.
2. Physiological adaptations to different environments -  
A. Marine. B. Shores and Estuaries. C. Fresh water. D. Extreme aquatic environments. E. Terrestrial life. F. Extreme terrestrial environments. G. Parasitic habitats.

### UNIT-IV Environmental physiology-II

1. Basic concept of environmental stress and strain concept of elastic and plastic strain, stress resistance, stress avoidance and stress tolerance.
2. Adaptation, acclimation and acclimatization.
3. Concept of homeostasis.
4. Endothermy and physiological mechanism of regulation of body temperature.
5. Physiological adaptation to osmotic and ionic stress, Mechanism of cell Volume regulation.
6. Osmoregulation in aqueous and terrestrial environments.
7. Physiological response to oxygen deficient stress.
8. Physiological response to body exercise.
9. Meditation, yoga and their effects.