M.Sc.- Life Science (F) Exam.-2013

Paper LS – 07: **Biological Tools Technique, Research Methodology**

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT- I

Principal and Application of Light- phase contrast, Fluorescence, Scanning and Transmission, Electron Microscopy, Cytophotometery and Flowcytometery, Fixation and Staining.

Principal and Application of Gel-Filtration, Ion-exchange and affinity Chromatography, Thin layer and Gas Chromatography, HPLC, Electrophoresis and Electrofocussing.

Ultracentrifugation (Velocity and Buoyan density), Spectroscopy-UV and Visible Spectroscopy. Photomicrography.

UNIT-II

Principal and practice of statistical method in life science, Sample and population, basic statistics average, Statistics of Dispersion, coefficient of variation, Standard Error, Coincidence limit, Probability distribution, Test of statistical significance, Simple correlation of Regression, Analysis of Variance.

UNIT-III

Research Methodology-1-An Overview of research process-Criteria of good research, common problems encountered during research, Qualities of good research

Scientific Writing as a means of Communication, Forms in Scientific Writing – Articles, Reports, Review Article, Monographs, Conference Proceedings, Processes of Writing Dissertation, Gallery proofing of manuscripts ISBN and ISSN Number.

UNIT-IV

Research Methodology – Presentation of data-General guidelines of present data , Types and Characteristics of good tables, Diagrams, Graphs, Limitations of the statistical methods.

Difference between research Journal and science magazine, qualities of good Journal, National and International Journal in life Science. Importance of journal in life science, Importance of patent in research, Process of getting rights.

UNIT-V

Use of Computers in life science. History and Generation of computer Fundamentals of Computer . Software Programme for life Science. Principal and working system of Audiovisual Equipments. Preparation of power point presentation.

SUGGESTED READING

Biological Tools, techniques, research Methodology Suggested Reading:-

1. Arora, P.N.malhan, P.K. Biostatistics Himalya Publishing house
2. Khan, Fundamentals of Biostatistics, publishing corporation .
3. Bliss, C.J.K., Statistics in Biology, Vol 1, Macgrew hill Newyork.
4. A test book of biophysics, Roy, R.N, New Central Book Agency.
5. Gupta-research Methodology and Statistical techniques, Deep and Deep Publication New Delhi.
6. Kothari, C.R., Research Methodology_Methods and techniques(2/e), vinhva Prakashan (A division of wiley Eastan- New Delhi)

LABORATORY EXERCISES

Biological Tools :- Techniques, Research Methodology

Practical :-

1. Thin layer chromatography
2. UV- Spectroscopy
3. Photo micrography
4. Collection and preparation of following:-

(A) Science notes

(B) Science Articles

(C) Review Articles

(D) Monographs

(E) Popular Science Articles

5. Submission of list of International/National Journals related to life science.
6. Preparation of one Questioner (Based on Problems Related to various field of life science) and presented it in form of writing including all step of writing processes,
   (with statistical Method)
7. preparation of power point presentation .(Any topic)

Paper LS – 08 : Plant Diversity

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT- I

Mycoplasma :

General characterstics and role in causing plant diseases.

Phycology :

Algae in diversified habitat, classification of Algae, Evolutionery trends in Algae.

Algal blooms, algae as brofertilizers, food, fuel and uses in industries, algae in symbiotic association and pollution indicator. Fossil algae.

UNIT- II

Mycology :

General account of fungi, classification and phylogemy of fungi. Nutrition, heterathallism, heterokaryosis and parasexuality in fungi.

Role of fungi in industries and medicines. Mushroom cultivation, mycorrhizal application in agriculture and plant growth, mycorrhiza as biocontrol agent.

UNIT- III

Bryophyta :

Salient features, classification, origin and distribution of Bryophytes. Economic importance of bryophytes with special reference to ecology, pollution indicator and monitoring.

Pteridophyta :

Salient features, classification of pteridophytes. Evolution of stele, heterospory. General account of fossil pteridophyte.

UNIT- IV

Gymnosperms :

General account of gymnosperms. Evolution, classification and their distribution in India. Brief account of fossil Gymnosperms.

Taxonomy of Angiosperms :

The species concept, principles used in assessing relationship. Salient features of International code of Botanical nomenclature.

UNIT- V

System of Angiosperms classification : Phenetic versus phylogenetic systems, relative merits and demerits of major systems of classification (Bentham and Hooker and Takhtajan).

Relevance of taxonomy to conservation, sustainable utilization of bioresources and ecosystem research.
Concept of phytogeography, hotspot and hottest hotspot, plant exploration, invasion and introduction. Local plant diversity and its socio-economic importance.

SUGGESTED READING

1. Alexopoulus, C.J. Mims, C.W. and Blackwel, M.1996 :Introductory Mycology, John Wiley & Sons Inc.

2. Cilfton, A.,19581: introduction to the Bacteria, Mcgraw-Hill Book Co. New York.

3. Kumar, H.D., 1988 :Introductory Phycology, Affiliated East-West Press LTD. New Delhi. Mandahar, C.L. 1978 :Introduction Delhi.

4. Mehrotra, R.S. and Aneja, R.S. 1998 :An Introduction to Mycology, New Age Intermediate Press

5. Morris I. 1986 :An Introduction to the Algae, Cambridge University Press U.K.

6. Parihar N.S. 1991 :Bryophyta, Central Book Depot, Allahabad.

7. Parihar N.S. 1996 : Biology Morphology of ptericlophytes, Central Book Depot Allahabad.

8. Puri, P. 1980 : Bryophytes, Atma Ram & Sons, Delhi,

9. Rangaswamy, G. and Mahadevan, A.,1999 :Diseases of Crop Plants in India(4th ed.)Prentice Hall of India Pvt. Ltd., New Delhi .

10. Sporne, K.K., 1991 : The Morphology of pteridophytes B.I. Publishing Pvt. Ltd., Bombay .

Stewart, W.N. and Rathwell G.W. 1993 : Paleobotany and the evolution of plants Cambridge University Press

11. Webster, J.1985 : Introduction to Fungi, Cambridge University Press.

LABORATORY EXERCISES

Morphological study or representative members of algae, fungi, bacteria, bryophytes and pteridophytes:Microcystis, pediastrum, Hydrodictyon, Ulva, pithophora, Sitgeoclonium, Drapranldiopsis, Closterium, Cosmarium, Chara,peronospora, Albugo, Mucor, pilobolus, yeast, Chaetomium, Pleospora, Morchella, Melampspora, Phallus, Polyporus, Drechslera, Phoma, Penicillium, Aspergillus, Colletotrichum, Marchantia, Anthoceros, Polytrichum, Psilotum, Lycopodium, Selaginella, Equisetum, Gleichenia, pteris, Ophioglossum, Isoetes.

Symptomonology of some diseased specimens:
White rust, downy mildew, powdery mildew, rusts, smuts, ergot, groundnut leaf spot, red rot of sugarcane, wilts, paddy blast, citrus canker, bacterial blight of paddy,

angular leaf spot of cotton, tobacco mosaic, little leaf of brinjal, seasame phyllody, mango malformation.

Study of morphology, anatomy and reproductive structures of bryophytes and pteridophytes .

Identification fungal cultures : Rhizopus, Mucor, Aspergillus, Penicillium, Chaetomium, Curvularia, Fusariam, Colletotrichum.
Sterilization methods, preparation of media and stains.

Paper LS – 09 : Animal Diversity

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT-I

Sytematics

Principles of Taxonomy and classification of non-chordates and chordates upto orders with salient features and examples.

UNIT- II

Lower Non-chordates

Protozoans and helminthes of medical importance; Origin of Metazoa, metamerism and symmetry; sponge industry; Polymorphism in coelentrates; Coral reefs; Parasitic adaptations in helminthes. Types and significance of coelom with examples.

UNIT – III

Higher Non-chordates

Economic importance of insects (including lac-culture, sericulture and Apiculture); social insects and their life cycle; Pest control. Torsion and detorsion in gastropods; Pearl culture and industry; Larval forms of Arthropods, Molluscs and Echinoderms. Affinities of Echinoderms.

UNIT – IV

Minor Phyla, Acrania and Agnatha

Salient features of various minor phyla with examples. Origin of Chordates; Affinities of Hemichordata, Urochordata and Cephalochordata; Retrogressive metamorphosis; General characters, habit, habitat ad distribution of Agnatha.

UNIT – V

Gnathostomata

Migration and economic importance of fishes; Exotic fishes; Adaptations and parental care in fishes and amphibians; Amphibians as biological control agents; living reptiles; Salient features of Dinosaurs and Archaeopteryx; Aerial adaptations and migration in birds; Salient features and affinities of Prototheria and Metatheria. Ecolocation in Bats; Adaptive radiations in mammals; Evolution of man.

Reference Books

1. Introduction to chordates : Manjupuria T.C.
2. A text book of Vertebrate Zoology : Parker, T. Jand Haswell, W.A.
3. A text book of Vertebrate Zoology : Prasad S.N.
4. The life of Vertebrates : Younge, J.Z.
5. Comparative Vertebrates Anatomy : Hayman. L.H.
6. Zoology of Chordates : Nigam, H.C.
7. Vertebrates : Kotpal, R.C.

SUGGESTED READINGS

1.Bhatnagar, S.P. and Moitra,A.,1996 gymnosperms new age International Pvt.Ltd.New Delhi.

2. Cole A.J. 1969 numerical taxonomy academic press, London.

3. Harrison, H.J. 1971: New Concepts in flowering Plant Taxonomy,Hieman Educational Books Ltd., London .

4. Heslop –Harrison, J., 1967 plant Taxonomy, English Language Book Soc. & Edward Arnold pub Ltd. U.K.

5. Heywoody V.H. and More D.M., 1984 Current Concepts in Plant Taxonom, Academic Press London

6. Jones A.D. and Wilbins A.D. 1971: variations and adaptations in plant species Heiman & Co-Educational Book limited London.

7. Jones S.B.Jr and luchsinger A.E.1986 plant systematic (1st ed.)

McGraw Hill Book CO. New York.

8. Nordenstam B., EL, gazaly G. and Kassas, M.2000:plant systematic for 21st century Portland Press Ltd . London.

9. Radford AE 1986 fundamentals of plant systematic, Harper and Row Publications USA.

10. Singh, H.,1978:Embroyology of Gymnosperms, Gebruder, Brotraeger, Berlin .

11. Solbrig, O.T. and Solbrig, D.J., 1979 : Population Biology and Evolution, Addison – Wesley Publishing Co.Inc.USA.

12. Stace , C.A.,1989:plant Taxonomy and Biosystematics, Edward Arnold Ltd. London

13. Stebbin, G.L., 1974: Flowering Plant-Evolution Above Species Level, Edward Arnold Ltd., London.

14. Takhtajan, A.L. 1997 :Diversity and classification of Flowering Plants, Columbia University Press, New York.

15. Woodland, D.W.1991:Contemporary plant Systematic, Prentice Hall,New Jersey.

16. Plant embryology : Bhojwani and Bhatnagar 2004

17. Plant anatomy : B.R. Vashistha.

18. Plant anatomy : Esau

LABORATORY EXERCISES

1. Comparative study of the anatomy of vegetative and reproductive parts of Cysas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Crytomeria, Taxodium, Podocarpus, Agathis, Taxus, Ephedra and Gnetum .
2. Study of important fossil gymnosperms from prepared slides and specimens .
3. Description of a specimen from representative, locally available families.
4. Description of various species of a genus; location of key characters and preparation of key generic level.
5. Location of key characters and use of keys at family level.
6. Field trips within and around the campus; compilation of field notes and preparation of herbarium sheets of such plants, wild or cultivated, as are abundant.
7. Training in using floras and herbaria for identification of specimens described in the class.

Practicals

1. Culture preparation : Paramecium and Englena
2. Systematic position habit and habitat of one animal of each class of the phyla.
3. Economic importance of any two animals of each phyla.

4. Identification of mosquitoe species.
5. Cockroach : I-Dissection of reproductive system
   II-Preparation of walking legs, thoracic spiracles and gonapophysis.
6. Pila : I- Dissection of digestive system, Nervous system.
   II- Preparation of Osphraium, radula and gill lamella.
7. Mouth parts of insects cockroach, honeybee, mosquitoe, house-fly and butterfly.
8. Dissection of the fish : Morphology and general anatomy, Wallago : afferent and efferent branchial vessels, brain and cranial nerves, eye muscles and their innervation, membranous labyrinth.

Paper LS – 10: Plant & Animal Physiology

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT-I

Water Relation of plants : Unique physicochemical properties of water solute potential. Water potential in the plant . apparent free space bulk movement of water soil plant Atmosphere continuum (SPAC) stomatal regulation of transpiration, anti transpirants.

Stress physiology plant responses to abiotic stress. Freezing and heat stress oxidative stress, tolerance water deficit & drought resistance, salinity stress.

UNIT-II

Photosynthesis : Energy pathway in photosynthesis , chloroplast as an energy transducing organelle . composition and characterization of photo systems I & II. electron flow through cyclic, noncyclic and pseudocyclic photophosphorylations. pathways of CO_2 fixation, difference between C_3 and C_4 photosynthesis, different kinds of C_4 pathways . CAM pathway . regulation of photorespiration.

Respiration : Concepts of free energy and entropy. Types of respiratory substrates and their utilization in respiration . Glycolysis and TCA cycle with emphasis on enzyme system, ATP synthesis through oxidative electron transfer chain (cytochrome system). Glyoxalate cycle.

UNIT-III

Balanced diet and nutritional deficiency diseases, Types and properties of muscle fibres; Physiology of muscle contraction, Cardiac cycle; Portal system; Lymphatic system; Cardiac diseases, Calvin cycle; Bohrs effect, Cellular respiration, respiratory disorders, Osmoregulation by kidneys. Homeostasis.

UNIT-IV

Nature and conduction of nerve impulse; Reflex action; structure and functions of different endocrine glands; mechanism of hormone action; hormonal disorders and pheromones.

UNIT-V

Neuroendocrine regulation of reproduction, Invitro fertilization, contraceptives. Threatened and endangered plant and animal speices – causes and their importance.

SUGGESTED READINGS

1. Plant Physiology : Bidwell- RGS MacMillan New York
2. The Hardiness of plant : Levitt- Academic press New York
3. Plant Physiology : HESS
4. Plant Physiology : Selisburry- E.B & Ross prentice Hall of India New Delhi
5. Plant & Soil water Relationship : A Modern Synthesis KRAMER, P..J. Mc. Graw Hill
6. Photosynthesis vol. I & II : Goyndjee & Govind jee Academic Press New York

REFERENCE BOOKS

1. Human Physiology : Chatterjee, C.C.
2. Physiology : Guyton and Hall

LABORATORY EXERCISES

1. To study the permeability of plasma membrane using different concentration of organic solvents.
2. To study the effect of temperature on permeability of plasma membrane.
3. To demonstrate the phenomenon of the osmosis by the use of potato osmometer.
4. To study the phenomenon of plasmolysis and deplasmolysis using Tradescantia/Rhoeo discolor leaves and different concentration of sugar.
5. To demonstrate the rate of transpiration by use of potometers (Ganong's/Farmers).
6. To study the relative rate of transpiration from the leaf surface of the different plant using cobalt chloride paper.

7. To demonstrate that light is necessary for photosynthesis.
8. To demonstrate the effect of different wavelengths of light during the photosynthesis.
9. To demonstrate the carbon-dioxide. Light, water and chlorophyll are essential for photosynthesis by moll's experiment.
10. To compare the rate of photosynthesis under different condition by using wilmott's bubbler.
11. Comparison of the rate of respiration (R.Q.) of various plant parts or substrates with the help of ganong's respirometer.

Practicals / Physiology

1. Demonstration of Calalase activity in liver.
2. Differential leucocyte count.
3. R.B.C. and W.B.C. enumeration.
4. E.S.R.
5. Haematocrit value.
6. Blood urea and haemboglobin estimation through spectrophotometer.
7. Haemoysis and crenation.
8. Bleeding time and clotting time.
9. Kymegraphic recording of muscle twitch.
10. Study of permanent slides of endocrine glands.

The students will prepare a record of threatened and endangered species of plants and animals.

SPECIAL PAPER
Paper LS-11 : ENVIRONMENTAL BIOLOGY I

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT-I

Basic concept and fundamentals:

- Structural organization of Environment.(population, community, Ecosystem, Biomes and Biosphere) and their components.

- Functional approach of Environment.(material cycle, bio-geochemical cycles sedimentation cycles, Energy flow, food chains, food webs and pyramids concept of equilibrium & Homeostasis)
- System concept in Environment. (system and models). Mathematical and operational modeling in environmental Biology.

UNIT-II

Natural resources and present status of India's environment

- Land, Land-use & management, forests and forest types, management of forests, social forestry, farm forestry, improvement measures.
- Water, various cycles and events of Hydrosphere, Lotic, Lentic and ground water, Dames and alternatives to big dams (eg. annicuts etc)
- Atmosphere, various cycles and events of atmosphere.

UNIT-III

Natural Resources conservation

- Natural resources: Definition, classification, conservation and management techniques and methods.

- Floral and faunal resources (including wildlife), endangered flora & fauna of India, international & National programmes (IBP,M&B, WWF,IUCN,BNHS etc.) for conservation. Impact of tourism on Bioresources.
- Energy as Resource: Sources, use and types of energy resources, conventional & Non- conventional energy sources, Energy crisis and conservation measures.

UNIT-IV

Environmental conservation and People

- Environmental Education (EE) & its role in Environmental conservation. EE at various levels, curricula and management of EE.
- Environmental activities and role of NGOS, People's participation, people's Biodiversity and resource Register, Environment movement of India and world with special reference to role of India and world with special reference to role of Amrita Devi & Bishnoi community of Rajasthan.Common Parasites and Pathogen of Domestic animals and crops.
- Major habitat type of the subcontinents, geographic origin and migration of species, common Indian mammals, birds, seasonality and phenology of the subcontinents.

UNIT-V

EIA, Monitoring, control and Global Env. Issues

- Environmental Impact Assessment (EIA), process, preparation of EIS, predication and assessment of Impacts of Various developing activities (Roads, Dams etc) and Industries on environment. Method of Impact analysis, public participation in EIA, PRA- technique, environmental audit, one case study.

- Pollution monitoring and control monitoring of air, water, soil, noise, food research methodologies in Environmental resources.
- Global environmental Issues such as Green house effect, Global warming, Ozone layer depletion, climate change, Population explosion, ENV. Health hazards, sustainable development.

SUGGESTED READINGS

1. E.P.Odum, fundamentals of Ecology. Saunders.
2. P.K. Gupta, Ecology. Rastogi.
3. Knight. Ecology, EEE.
4. elements Ecology
5. M.C. Dash fundamental of Ecology. TMGH.
6. R.K. Trivedi (ed) Ecology & Pollution of Indian Rivers. Ashis Pub House.
7. P.D. Sharma Ecology& Environment. Rastogi.
8. E.J. Kormondy Concepts of Ecology. Prentic-Hall.

LABORATORY EXERCISES

1.Study and analysis of soil and water for various physical chemical and biological chemical & biological parameters. (a) Soil characteristic (b) Water characteristic & Community

2. Study of population & community using standard methods (Quadrates, line transect, point frameetc)

3. Study of Ecosystems (a) aquatic (River and pond/ tank) (b) Forest (use of biospectrum method).

4. Simple mathematical model preparation. (use of statistical methods).

5. Study of (a) Various habitats . (b) Qualitative & Quantitative estimation of planktons.

6. Visit to Instries / Dams / Sanctuaries / National park / Env. Research lab.

7. Analysis of environment curricula at various levels: School, University, Non-formal education

8. Preparation of a report on natural resources at local level.

9. Study of EIA Reports of local industry / Road / Dams. Preparation of a mock-report.

10. Field study of an aquatic / terrestrial ecosystem and submission of report of student's original data.

SPECIAL PAPER

Paper LS-12 : ENVIRONMENTAL BIOLOGY II

Min Pass Marks - 36 Duration - 3 hrs MM - 100

Note : The question paper will contain three sections as under –

Section-A : One compulsory question with 10 short questions, having 2 questions from each unit. Candidates have to answer each question in 20 words.

Total marks : 10

Section-B : There will be 10 questions in all, 2 questions from each unit. Candidates have to attempt 5 questions taking atleast one from each unit. Answer should be in approximately 250 words Total marks : 50

Section-C : There will be 04 questions (question may have sub-divisions) covering all units but not more than one question from each unit. Answer should be descriptive type, in about 500 words. Any 2 questions to be attempted by the candidate.

Total marks : 40

UNIT-I

Biodiversity :- Biodiversity conservation agenda -21

Biodiversity conservation- Global agreements and national concerns, RAMSAR sites, CBD,

Ecological resistance movement :- Indigenous and present movements

UNIT-II

Bioconservation of the Environment :-

Bioconservation and agricultural system:- Biological farming, Ecological farming system, Integrated intensive farming system (IIFS), Low external input supply agriculture (LEISA),

Alternatives to current pesticide use:- Behavioral changes, Biological control, Integrated pest management(IPM), personal safety.

UNIT-III

Remote sensing and GIS for environmental Biology :-

Remote sensing- Application, Scope, Geographical information system (GIS), GIS application.

Microflora of atmosphere:- Air sampling techniques, identification of aeroallergens, airborne diseases.

Disaster management:- floods, Earthquake, Cyclone.

UNIT-IV

Social Issues and the Environment :-

From unsustainable to sustainable development, Urban problems related to energy, water conservation rain water harvesting, watersheds management, wasteland reclamation.

Environmental ethics:- Issues and possible.

UNIT-V

Environmental protection Acts :-

- Air (Prevention and control of pollution) Act
- Water (Prevention and control of pollution) Act
- Wildlife protection Act
- Forest conservation Act

Issues involved in enforcement of environmental legislation.

SUGGESTED READINGS

1. E.P.Odum, fundamentals of Ecology. Saunders.
2. P.K. Gupta, Ecology. Rastogi.
3. M.C. Dash fundamental of Ecology. TMGH.
4. R.K. Trivedi (ed) Ecology & Pollution of Indian Rivers. Ashis Pub House.

LABORATORY EXERCISES

1. Submission on project report note on current Environmental Acts.

2. Current Biodiversity conservation Act by Govt. (collection of report)

3. General suggestion of Biodiversity conservation.(submitted a report)

4. Survey of your city to know Environmental problems.