RS - 1023

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Proposed Theory & Practical papers to be studied from F.Y.B.Sc. To T.Y.B.Sc. Zoology. (W.e.f. Acd.Yr. 2002-2003)

4

Paper-I Anatomy of Non-Chordates-I & Chordates -I

1st Term	2nd Term
Anatomy of Non-Chordates-I	Anatomy of Chordates-I
Present Syllabus + rearrangement	Present Syllabus + rearrangement

Paper-II Environmental Biology & Applied Zoology-I

1st Term	2nd Term
Environmental Biology	Applied Zoology-I
Present Syllabus + rearrangement	Vermiculture, fishery, poultry

Paper-III Practical

Practicals related with theory courses of F.Y.B.Sc.

S.Y.B.Sc.

Paper-I Anatomy of Norchordates-II & Chordates-II

1st Term	2nd Term
Anatomy of Non-Chordates-II	Anatomy of Chordates-II
Present Syllabus + rearrangement	Present Syllabus

Paper-II Genetics & Applied Zoology

1st Term	2nd Term
Genetics	Applied Zoology-II
Present Syllabus of F.Y.B.Sc. Paper-II (Genetics + rearrangement)	Agricultural Pest ad Their Control & Apiculture

Paper-III Practical

Practicals related with theory courses of S.Y.B.Sc.

T.Y.B.Sc. (Principal)

Paper-I	Anatomy of Nonchordates-III Chordates-III
Paper-II	Cell Biology & Development Biology
Paper-III	Histology & Physiology
Paper-IV	Biochemistry & Microtechnique
Paper-V	Parasitology & Molecular Biology
Paper-VI	Biotechnology & Public Health & Hyegine /Pathology
	OR
	Modern Trends in Zoology (Biotech + Bioinformatics)
	OR
	Computer Applications in Zoology

****

॥ अंतरी पेटवू ज्ञानज्योत ॥

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus for F.Y.B.Sc. Zoology. (W.e.f. Acd.Yr. 2002-2003)

Paper-I Section-I Non chordates-I.

Study of taxonomy

i) Definition of taxonomy and components of classification
ii) Linnaean Hierarchy
iii) Nomenclature – Binomial
iv) Concept of Species (5 P)

1. Define the following Terms with suitable Examples.

i) Symmetry – Asymmetry, bilateral and radial
ii) Germ layers – diploblastic, Triploblastic,
iii) Coelom - acoelomate, pseudocoelomate, coelomate
iv) Metamerism
v) Hermaphroditism
vi) Regeneration(Planaria)
vii) Ecdysis(Moulting) (5 P)

2. Study of Cockroach (Periplaneta americana) w.r.t. following

i) Classification with reasons, distribution ,habit and habitat. (1 P)
ii) External characters – Head,thorax,abdomen,wings,legs,sexual dimorphism. (4 P)
iii) Internal anatomy w.r.t. following systems.
a) Digestive system – food and feeding habits, alimentary canal, digestive glands and physiology of digestion. (5 P)
iv) Respiratory system – spiracles,tracheal system and mechanism (3 P)
v) Circulatory system – Haemocoel,Haemolymph (with haemocyte types) sinuses, heart, segmental vessels,dorsal diaphragm, alary muscles, pericardial cells, mechanism of circulation of haemolymph (7 P)
vi) Excretory system – Malpighian tubules structure and functions of hind gut, fat bodies, nephrocytes, urate cells, integument as excretory organs. (3 P)
vii) Nervous system – Central nervous system,Visceral Nervous system, Peripheral nervous system (3 P)
viii) Sense organs – Mechanoreceptors, chemoreceptors, auditory photoreceptors. (3 P)
ix) Reproductive system – Male, Female reproductive organs copulation, fertilization, ootheca formation, oviposition, & life cycle. (6 P)

Total Periods - 45

Cont..3

PAPER–I SECTION–II

Anatomy of Chordates –I

1. General topics
   I) Definitions with examples.
   (a) Migration, (b) Herbiverous (c) Carnivorous, (d) Omnivorous,
   (e) Sanguivorous, (f) Graminivorous, (g) Insectivorous, (h) Frugivorous,
   (i) Oviparous, (j) Viviparous, (k) Ovoviviparous, (l) Neoteny,
   (m) Paedogenesis, (n) Hibernation , (o) Aestivation (2 P)
   II) Parental Care - In Sea Horse & In Pipa (2 P)

2. Animal Type – Study of Frog (Rana tigerina) w.r.t Followinng
   I) Systematic Position
   II) Habit & Habitats in brief
   III) External Characters (3 P)
   IV) Internal Anatomy
   a) Body wall – Structure and Functions (1 P)
   b) Digestive System - Alimentary Canal, Digestive glands, food and feeding, digestion, absorption, Assimilation in brief and egestion (Histology of organs not expected) (7 P)
   c) Respiratory System – Organs, Cutaneous Respiration, Buccal Respiration, Pulmonary Respiration and mechanism (4 P)
   d) Circulatory System – Detailed Structure of heart, Composition of blood and it's functions, Arterial and Venous System, Mechanism of circulation. (7 P)
   e) Excretory system – Detailed structure and functions, kidney, mechanism of excretion. (3 P)
   f) Nervous system –
      i) Central nervous system-brain and spinal cord
      ii) Peripheral and iii) autonomous nervous system in brief. (4 P)
   g) Sense organs – Structure and functions of eye and ear. (2 P)
   h) Reproductive system – sexual dimorphism, male and female reproductive system male and female gamets (Histology of testes and ovary not expected.) (4 P)
   i) Development Embryology fertilization, cleavage, blastula and gastrula.
   Metamorphosis. (6 P)

Total Periods - 45

Cont..4

PAPER–II SECTION-I

Environmental Biology

1. Introduction – What is an environment? Concepts, scopes and significance of environmental biology (2 P)

2. Components of environment :-
   A) Definition of followings
      i) Biosphere. ii) Atmosphere. iii) Lithosphere. iv) Hydrosphere
   B) Abiotic factors :- special emphasis on
      i) Light, ii) Temperature, iii) Water, iv) Soil.
   C) Biotic factors – i) Producers, ii) Consumers, iii) Decomposers. (7 P)

3. Ecosystem :- Definition, names of different ecosystems, pond as an ecosystem. (2 P)

4. Definitions of ecological niche, an ecological succession and mention its types (2 P)

5. Ecologilcal energetics :- Energy, energy flow, food chain and its types, food web, ecological pyramids. (5 P)

6. Environmental adaptations:- i) Aquatic – primary and secondary ii) terrestrial - a) cursorial, b) fossorial, c) Aerial, d) Arborial, e) Desert. (6 P)

7. Animal associations:- Definition , homospecific, composition for food, shelter and reproduction, Heterospecific and it's types :- i) commensalism, ii) mutualism, iii) parasitism. (2 P)
8. Resources :- Renewable, nonrenewable resources and energy crisis. (6 P)

9. Environmental Pollution :- Definition, Names of different types of pollutions.
   i) Air Pollution :- Air pollutants and their impact on human being and green house effect.
   ii) Water pollution :- Water pollutants and their impact on human being. (8 P)

10. Conservation of nature :- i) preservation of species, extinction of species due to habitat destruction and mass killing,ii) wild life conservation acts. (5 P)

Total Periods - 45

Cont..5

PAPER–II SECTION–II

VERMICULTURE

1) Introduction and scope. (1 P)
2) Species of earth worms. (1 P)
3) External morphology (1 P)
4) Digestive system of earthworm
i)food. ii) feeding habitat. iii) alimentary canal, iv) physiology of digestion, v) worm castings. (3 P)
5) Earthworm culture in farm and gardens.
   i) Size of ditch.
   ii) Raw material required.
   iii) Rearing of earthworms.
      a) Climatic factors. b) cocoon formation. c) separation of cocoons and earthworm.
   iv) protection from enemies, predators and parasites. (7 P)
6) Vermicompost :- i) Components, ii) Advantages – as a biofertilizer. (4 P)

Total Periods - 17

FISHERIES

1) Introduction and scope of fisheries. (1 P)
2) Types (in brief) :- i) Inland fishery. ii) Estuarine fishery.
iii) Marine fishery (2 P)
3) Construction and maintenance of fish farm
   i) Selection of site. ii) Excavation of ponds.
      a) Hatchery, b) Nursery pond, c) Rearing pond. d) Stock pond, (iii) Source of water. iv) Manures. v) Fish seed – Monoculture and polyculture . vi) supplementary feed – Rice bran, groundnut oil cake. (6 P)
4) Causes of spoilage of fish and methods of preservation.
   i) chilling, ii) freezing, iii) freeze drying, iv) smoke drying, v) salting, vi) canning and processing. (4 P)
5) Characteristics of cultivable species fish growth, maturation, fecundity and breeding habits of Catla catla, Labeo rohita, Cirrhina mrigala, Cyprinus carpio. (4 P)

Total Periods - 17

Cont..6

POULTRY

1) Introduction.
   Concept. scope and importance
2) Classification of Indian fowl, Gallus gallus domesticus.
3) Habit and habitat (2 P)
   External morphology of Gallus gallus domesticus
4) Types of various poultry breeds (2 P)
5) Poultry breeds. (1 P)
6) Parasites and predators (1 P)
7) Diseases, symptoms and prevention and control measures. (2 P)
8) Economic importance and nutritive value of egg of hen. (1 P)
9) Poultry care management and marketing (2 P)

Total Periods -11

Cont..7

SYLLABUS FOR PRACTICALS
AT
F.Y.B.Sc. ZOOLOGY

PRACTICALS : NONCHORDATES – I AND ANATOMY OF CHORDATES –I

1.(E) Study of taxonomic classification with binomial nomenclature of three animals from nonchordate and three from chordates.
Taxonomic classification should include phylum,class, order, genus and species.
Nonchordate animals :- Earth worm, Lobster, Pila, Bivalve, Scorpion, Housefly, Mosquito, Star fish
Chordate animals -Scoliodon, Labeo, Pomphret, Frog or Toad, any snake, any Lizzard, any Bird and any mammal.

2. (D) Study of symmetry in following animals.
1) Amoeba, 2) Hydra, 3) Jelly fish, 4) Earth worm, 5) Pila, 6) Starfish, 7) Any suitable vertebrate

3. (D) Study of following animas w.r.t. coelome.
1) Hydra, 2) Sea-anemone 3) Liver fluke\Planaria\Tapeworm, 4) Ascaris, 5) Earth worm\Neries\Leech.

4. (E) Dissection of Cockroach :- 1) External characters and sexual dimorphism . 2) Study of following systems:- a) Digestive system with salivary glands, b) Nervous system, c) Male and female reproductive system. 3) Temporary preparation of following:- a) Mouth parts, b) Antannae of male and female, c) Legs, d) Wings, e) Salivary glands, f) Spiracles – thoracic and abdominal, g) Trachea, h) Cornea, i) Gizzard. 4) Observation of male and female – Gonapophysis , Heart and alary muscles, Ootheca.

5. (D):- Study of parental care in following animals.
1) Sea horse, 2) Pipa species with suitable model\chart\specimen

6. (D) :- Study of following sytems from dissected frog.:- 1) Digestive system – Internal structure of buccal cavity, Alimentary canal. 2) Respiratory system – Lungs. 3) Circulatory system – Heart with truncus arteriosus, two main aortic arches and three vena cavae close to heart.4) Excretory system – Kidney, ureter and urinary bladder. 5) Male reproductive system – Testes.
6) Female reproductive system – Ovaries. Oviduct, cloaca.7) Nervous system – Brain Dorsal and ventral view

7. (D):- Study of developmental stages in frog. – sperm, fertilized egg, two celled stage, four celled stage, blastula, gastrula and various prominent stages and development in tadpole larva.

Cont..8

PRACTICALS – ENVIRONMENTAL BIOLOGY.

1. Estimation of O_2 from given water sample.(E)
2. Estimation of CO_2 from given water sample. (E)
3. Study of fauna from fresh water sample. (E)
4. Study of hardness of water. (E)
5. Study of animals w.r.t. following habitats. By showing suitable specimens\models\charts.- 1) Aquatic, 2) Terrestrial – a) Arial, b) Arboreal, c) Cursorial, d) Fossorial. (D)
6. Study of heterospecific animals association – 1) symbiotic, 2) commensals, 3) parasitic. (D)
7. Compulsory visit to any ecosystem. (D)

PRACTICALS (VERMICULTURE, FISHERIES , POULTRY)

I. 1) Identification of any two species of earthworms. -- i) External morphology, ii) Cocoon.
   2) Culture methods:- i) Worm casting , ii) Humus, iii) Vermicompost.

II :- 1) Mounting of scales:- i) cycloid, ii) ctenoid, iii) placoid
   2) Identification of external morphology of – i) Catla catla, ii) Labeo rohita iii) Cirrhina mrigala , iv) Cyprinus carpio
   3) Compulsory visit to fisheries.

III :- 1) Study of external characters of Indian fowl with sexual dimorphism. Identifications of different breeds of poultry. (D)
   2) i) Study of parasites and predators. ii) Diseases their symptoms and preventive measures and conrol. (D)
   3) Compulsory visit to poultry for poultry care management and marketing.

D – Demonstration
E – Experimental

REFERENCE BOOKS
PAPER-I

1. A Text book of Zoology – Invertebrate Vol 1& 2, 1992, 7th edition, Parker & Haswell, Edited By Marshall & William, CBS Publisher and distributors, New Delhi.
2. Life of Invertebrate, 1992, By S.N. Prasad, Published by Vikas Publishing House, New Delhi
3. A text book of Zoology- Vertebrate, By S.N. Prasad, Published by Vikas Publishing House, New Delhi
4. Invertebrate Zoology, E. L. Jordan, S. Chand & Company, New Delhi
5. Vertebrate Zoology, E. L. Jordan, S. Chand & Company, New Delhi
6. Invertebrate Zoology, 1992, 4th Edition Reprint, P./s Dhami and J. K. Dhami, R. Chand and Co., New Delhi
7. Invertebrate structure and function. E.L.B.S. 2nd Edition 1979, E.J.W. Barington.
8. The Invertebrate,1967; L. A. Barradaile and F.A. potts, Cambridge University Press.

Cont..9

9. Life of Vertebrate – 3rd Edition. 1983. J. Z. Young. ELBS. Oxford.
10. The Frog : An Introduction to Anatomy, Histology and Embryology, 12th Edition 1956. A. M. Marshall. MacMillan & Co. Ltd, London.
11. The Biology of the Frog 4th Revised edition. 1960. S. J. Holmes, The MacMillan & Co. Ltd. New York.
12. The Biology of Amphibia. 1950. G. Kingsley Noble, Dover Publication Inc., New York.
13. Modern Textbook of Zoology – Vertebrate. 1992. R.D. Kotpal, Rastogi Publications.
14. The Frog: Its reproduction and Development. 1951. Robert Rugh. McGraw Hill Book Company. New York.
15. Development of the Frog. 1992. C. B. Pawar, Himalaya Publishing Company, Mumbai.
16. A Text Book of Chordate Zoology. 1988. R.C. Dalela, Jai Prakash Nath publications, Meerut.
17. The Phylum Chordate. 1987. H. H. Newman, Distributor Satish Book Enterprise, Agra.

REFERENCE BOOKS
Paper-II

1. Environmental Pollution : Causes, Effects and Control, 1991, Inderjeet Sethi, S. A. Equbal, Commen Wealth Publishers, New Delhi.
2. Environmental Biology, 2nd Edition, 1993. K. C. Agrawal. Agro Botanical Publishers, Bikaner. India.
3. Pollution of our Atmosphere. 1984, Dr. Henderson, Sellers University of Salford.
4. Impact of Environment. 1993. I. V. Trivedi.
5. Water Life and Pollution. 1990. Purohit, Saxena, Agro Botanical Publishers, Bikaner, India.
6. Environmental Problems, Prospects and Constraints. 1992. R. N. Tridevi. Global Publication, New Delhi.
7. Applied Environmental Biology – Resources and Management, 1990. M. M. Saxena. Agro Botanical Publishers- India.
8. Environmental Protection and Law. 1994. P. R. Trivedi, and V. K. Singh. Commen Wealth Publishers. New Delhi.
9. Concept of Ecology. 3rd Edition, 1986. E. J. Kormonday.
10. Text Book of Ecology – by Virbala, Rastogi.
11. Fundamentals of Ecology, 3rd Edition – by Odum E. P., Published by Sunders College. Publishing.
12. Zoogeography – by Darlington.
13. Ecology – by South Week.
14. Dynamic Zoogeography (WRI Land Animals) by Miklos. D. F. Udvardy. published by Van Nostrand Reinhold Co. New York.
15. Animal Ecology by Pearce, Mc Graw-Hill Book Co, New York.
16. Animal Adaptation by Allison L. Burnetz and Thomas. Modern Biology Series. Holt.
17. Fisheries Developments, K.K. Trivedi. Oxford and IBH-Publication Company.
18. Animal Husbendary 1991, G. C. Banarjee. Oxford and IBH Publication Co.

Cont..10

19. Bee and Bee Keeping 1978, Riger A. Morse, Cornell University Press, London
20. Marine fishes in India, 1990, D. V. Bal and K. Virabhadra Rao, Tata McGraw Hill Publication Co. New Delhi
21. Fishery Management, 1990, S .C. Agrawal, Ashish Publication House, New Delhi
22. An Introduction to the study of fishes, 1994. Albert C.L.G. Gunther, Atlantic Publishers and Distributors, New Delhi
23. Hand Book of the fresh water fishes of India, 1990, R. Beaven, Low Price Publication, Delhi
24. Fish and Fisheries of India, 1991, V.G. Jhingram Hindustan Publication Corporation, Delhi

****