

UNIVERSITY OF PUNE

Circular No. 235 of 1996

In pursuance of the decision taken by the University authorities, it is hereby notified for the information of all concerned that the revised syllabus for F.Y.B.Sc. Zoology is as given in appendix.

The revised syllabus will be implemented from the Academic year 1996-97.

The Principals of all affiliated Colleges in Science where Zoology is taught are requested to bring the contents of this circular to the notice of all teachers and students concerned.

Ganeshkhind,
Pune-411 007.

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for Registrar

Ref.No. CB/S/609
Date : 17.6.1996

To,
The Principals of all affiliated Science Colleges.

Copy f.w.cs.to for information :-

- 1) The Deans, of Science faculty.
- 2) The members of the Boards of Studies in Zoology
- 3) The Dy.Registrar (Examination 1,2,3,4)
- 4) The Asstt.Registrar (Exam.Co-ordination Unit)
- 5) The Asstt.Registrar (Exam.S & T Unit)
- 6) The Asstt.Registrar (Eligibility)
- 7) The Asstt.Registrar(Records & Meeting)
- 8) The Public Relation Officer
- 9) The Law Officer,
- 10) The P.A.to Registrar
- 11) The University Sub-Centres at Ahmednagar,Dhule & Nasik
- 12) The General Secretary,PUTA,PUCIO
- 13) The Data Processing Unit,Pune-7.
- 14) The Dy.Registrar (Admission)
- 15) The Asstt.Registrar(External)
- 16) The Section Officer(Affiliation)
- 17) The Section Officer, (Recognition)
- 18) The Asstt.Registrar(Strong Room)

Ref : V.C. Approval dated 12.6.1996

UNIVERSITY OF PUNE

BOARD OF STUDIES IN ZOOLOGY

DRAFT OF REVISED SYLLABUS

F.Y.B.Sc.

First Term.

Zoology Paper I :- Nonchordates and Chordates - I

- I. Principles of classification : (7 Lectures)
- i) Importance of classification.
 - ii) Binomial Nomenclature
 - iii) Five kingdom approach
 - iv) Taxonomic heirarchy
 - v) Concept of species.
- II. Study of animal Types :
- 1) Study of Paramecium with reference to classification, habit , habitat, general morphology, structure of pellicle locomotion, nutrition, respiration, excretion, osmorgulation and reproduction (Binary fission & Conjugation).
(12, Lectures)
 - 2) Study of Hydra with reference to classification, Habit, habitat, general morphology, body wall, cell types, feeding and digestion , sexual and asexual reproduction, locomotion, nervous system.
(9 Lectures)
 - 3) Study of Earthworm with reference to classification, habit, habitat, external morphology, structure of bodywall, coelom and locomotion.

Functional anatomy of digestive, respiratory, blood vascular, excretory, reproductive systems and cocoon formation.

(15 Lectures)

SECOND TERM

III. Study of Animal Types :

- 1) Study of Amphioxus with reference to classification, habit, habitat, external morphology, structure of integument, musculature and notochord, body cavities.

Functional anatomy of digestive, respiratory, circulatory, excretory, nervous system, sense organs, reproductive system, and development. (10 Lectures)

- 2) General characters of cyclostomes (2 Lectures)

- 3) Study of frog with reference to classification, habit, habitat, external morphology, sexual dimorphism, structure of body wall, body cavities, Endoskeleton.

Functional anatomy of digestive, respiratory, circulatory, excretory, nervous system and sense organ and reproductive system development and metamorphosis,

(20 Lectures)

REFERENCE BOOKS

1. Schaum's outline Series, Theory and Problems of Zoology, 1988, M.M.Jessop; McGraw Hill Book Company.
2. Living Invertebrates, 1987 Pearse/Buchsham; Blackwell Scientific Publications, California.
3. Biology, The Web of life, 1993 D.D.Chiras ; West Publishing company, Minneapolis/St.Paul, New York.
4. Text book of Zoology-Invertebrate, Vol. 1, 1992 7th edition; Parker and Haswell; edited by Marshall and William; CBS Publishers and distributors, New Delhi-
5. Invertebrate Zoology, E.L. Jordan, S.Chand and Company, New Delhi.
6. Life of Invertebrate, 1992, S.k.Prasad, Vikas Publishing House, New Delhi.
7. The Invertebrates : Protozoa through Ctenophora, 1940, L.H.

- Hyman, Mc.Graw Hill Co. New York and London.
8. Biology of Earth... C.A. Edwards and J.R. Lott, Chapman and Hill, London.
 9. The invertebrate a new synthesis, RSK Barnes, P. Calow & P. J. W. Olive; Blackwell Scientific Publications, Oxford.
 10. Invertebrate Zoology, 1992, 4th Edition Reprint, P.S. Dhami & J.K. Dhami R. Chand & Co., New Delhi.
 11. Invertebrate Structure and function, E.L.B.S. 2nd Edition, 1979 E.J.W. Barrington.
 12. Protozoology, 1953, R.P. Hall, Asia Publishing House, Bombay
 13. ~~R.R.K.~~ Pheretima, 1960, K.N. Bahl, Lucknow Publishing House, Lucknow.
 14. Annelids, 2nd Edition, 1967, R. Phillips Dales, Hutchinson University Library, London.
 15. The Invertebrate, 1967, L.A. Borradaile & F.A. Potts, Cambridge University Press.
 16. Text book of Zoology- Vertebrate, Vol. 2. 1992, 7th Edition, Parker and Haswell, edited by Marshall and William; CBS Publishers and distributors, New Delhi.
 17. Chordate Zoology, S. Chand and Company, New Delhi.
 18. The Life of Vertebrates, 3rd Edition 1983, J.Z. Young, ELBS Oxford.
 19. The Frog, An Introduction to Anatomy, Histology & Embryology, 12th Edition 1956, A.M. Marshall, Macmillan & Co. Ltd. London,
 20. The Biology of the Frog, 4th Revised Edition 1960, S.J. Holmes. The Macmillan Co. Ltd. New York.
 21. The Biology of the Amphibia, 1959, G. Kingsley Noble, Dover Publications. Inc. New York.
 22. Modern Textbook of Zoology- Vertebrates, 1992 R.L. Kotpal, Rastogi publication.
 23. The Frog: Its reproduction and Development, 1951, Robert Rugh, McGraw-Hill Book Co. Inc. New York.
 24. Development of the Frog, 1992, G.B. Powar, Himalaya Publishing Co. Bombay.
 25. A test-book of chordate Zoology, 1988, R.C. Dalela, Jai Prakash, Nath publications, Meerut.
The Protochordates, 1982, K.S. Bhatia, Central Book Dept. Indian University, Allahabad.

26. The phylum chordata, 1987, H.E, Newman, Distributor Satish Book Interprise, Agra.

ZOOLOGY PAPER II : Environmental Pollution and Genetics

FIRST TERM

ENVIRONMENTAL POLLUTION

- I. Introduction to environmental Pollution : (2 Lectures)
- i) Types : Air, water and Soil.
 - ii) Environmental compartments and their inter-relationship.
 - iii) Biodegradable and nonbio-degradable pollutants.
- II. Air Pollution : (8 Lectures)
- 1) General problems.
 - ii) Sources and eco-system effects of :
With reference to smog, human health hazards and global warming.
 - a) Sulphur oxides.
 - b) Nitrogen oxides.
 - c) Carbon monoxide.
 - d) Carbon dioxide.
- III. Water Pollution : (10 Lectures)
- 1) General Problems.
 - ii) Water Pollution due to following :
 - a) Agricultural.
 - b) Industrial.
 - c) Domestic (sewage)-

Note :- Following topics must be covered under 'Water Pollution'

- i) harmful effects of pesticides on animals.
- ii) harmful effects of heavy metals (Mercury and cadmium) on animals.
- iii) Faunal changes in river due to sewage pollution.
- iv) Various effects of industrial wastes on aquatic ecosystem.
- v) Eutrophication.

- IV. Soil Pollution : (6 Lectures)
- i) Soil pollution due to :
- a) Industrial Wastes.
 - b) Salination caused by water logging.
(Wrong agricultural practices)
- V. Introduction to sound pollution, radiation pollution and its effects on human health. (2 Lectures)
- VI. Introduction to pollution control technology (1 Lecture)

SECOND TERM

GENETICS

- I. Recapitulation of Mendelism. (2 Lectures)
Practical applications of Genetics.
- II. Interaction of genes : (4 Lectures)
- i) Complementary factor (9: 7 ratio)
 - ii) Supplementary factor (9: 3 : 4 ratio)
 - iii) Inhibitory factor (13 : 3 ratio)
 - iv) Duplicate factor (15 : 1 ratio)
- III. Lethal genes concept : (1 Lecture)
Coat colour in mice (2 : 1 ratio)
- IV. Chromosomes : (8 Lectures)
- i) Morphology : Metacentric, submetacentric, acrocentric, telocentric and satellite.
Primary constriction and secondary constriction.
 - ii) Types :
 - a) Autosomes and sex-chromosomes.
 - b) Giant chromosomes : Lampbrush and polytene chromosomes.
 - iii) Chromosomal aberrations :
 - a) Numerical Changes : Aneuploidy, Euploidy and polyploidy
 - b) Structural changes : Deletion, duplication, inversion and Translocation.

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iv) Chromosomal theory of Inheritance.

V. Sex-Determination : (5 Lectures)

i) Types : ZZ - ZW Method, XX - XO Method and Honey bee method.

ii) Gynandromorphs.

iii) Holandric genes : hypertrichosis.

iv) Sex-influenced genes : baldness in man.

VI. Multiple Allels : (2 Lectures)

i) Definition.

ii) Characteristics.

iii) Inheritance of blood groups and its medico-legal applications.

VII. Polygenic Inheritance : (2 Lectures)

i) Definition.

ii) Characteristics.

iii) Skin Colour in man.

VIII. Human Genetics. (6 Lectures)

a) Karyotypes.

b) Inborn errors of metabolism in human heredity.

c) Syndromes : Klinefelters Turners.

d) Eugenics.

IX. Simple examples on the topics II & VI (2 Lectures)

REFERANCE BOOKS (ENVIRONMENTAL POLLUTION)

1. Environmental pollution-causes, Effects & Control, 1991, Inderjaet sethi, S.A. Eqbal, commonwealth publishers, New Delhi.
2. Environmental Biology, 2nd Edition, 1993, K.C.Agrawal; Agro Botanical publishers - Bikaner, India.
3. Pollution of our Atmosphere, 1984, Dr.B.Henderson, sellers University of Salford.

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4. Impact of Environment, 1995, I.V.Trivedi.
5. Water Life & Pollution, 1990, Purohit, Saxena; Agro Botanical publishers - India, Bikaner.
6. Environmental Problems, Prospects & constraints, 1992, R.N.Trivedi, Anmol Publication, New Delhi.
7. Applied Environmental Biology, Resources & Management, 1990.
M.M.Saxena; Agro Botanical publishers - India.
8. Environmental Protection challenges & Issues, 1993,
V.S. Mahajan, Deep & Deep Publications, New Delhi.
9. Environmental protection & Law, 1994, P.R. Trivedi & V.K. Singh, Commonwealth Publishers - New Delhi.
10. Elements of Environmental Chemistry, 1992, H.V.Jadhav,
Himalaya Publishing House, Bombay.
11. Environmental Chemistry, 2nd Edition, 1992, A.K.De Wiley Eastern Limited, New Delhi.
12. Concepts of Ecology, 3rd Edition, 1986, E.J.Kormondy.
13. Pollution of our atmosphere, 1984, Henderson- sellers.
Adam Hilger Ltd. Bristol.
14. Environmental Wild Life Impact Analysis, 1992, S.K.Shukla,
P.R.Shrivastava, Commonwealth Publishers - New Delhi.
15. Water Pollution & Management, 1985, C.K.Varshney; Wiley Eastern Limited - New Delhi.
16. Environmental Health, 1971, P.Walton Purdom; Academic Press @ New York.
17. Environmental pollution, Timmy & Satake, Anmol publication,
New Delhi.
18. Environmental Pollution 1989, Yogendra Srivastava, Ashish publication House, New Delhi.
19. Chemical and Biological methods for water pollution studies, 1984, B.K. Trivedi and P.K.Goel, Environmental Publications, Karad.

20. Environmental Pollution, 1989, Timmy Katyal and M.Satake, edited by Rajkumar, Anmol Publication, New Delhi.
21. The air pollution & Climate change, the biological impact, 1994, Welburn Alan, Longman Scientific and Technical, England.
22. Biology and water pollution, 1990, Mason C.F.
23. Environmental Pollution, 1984, Manivasakam, National Book Trust, New Delhi.

REFERENCE BOOKS (GENETICS)

1. Principles of Human Genetics, 1968, Curt stern. Eurasia publishing house, New Delhi.
2. Cytogenetics, The chromosome in Division, Inheritance and Evolution, 1982, Carl. P.Swanson, Timothy mer 2, William. J.Young, Prentice-Hall of India, New Delhi.
3. Introduction to Genetics, 1991, T.S.Gopalkrishna, Dr.Itta sambasiviah and Dr.A.P.Kamalakara Rao, Himalaya Publishing House, Bombay.
4. Theory and preblems of Genetics, 1983, William D. stansfield, Schaum's outline series McGraw-Hill Book Company, New Delhi.
5. Genetal Genetics, 1970, Adrian. M.SRB, Ray.D.owen and Robert. S.Edgar. Eurasia publishing house, New Delhi.
6. Principles of Genetics, 1990, Edmund.W.Sinnott, L.C.Dunn and Theodosius Dobziansky, Tata McGraw hill publishing Company, New Delhi.
7. Fundamentals of Genetics, 1990, B.D.Singh, Kalyani Publishers-New Delhi, Ludhiana.
8. The Science of Genetics, 1983, George,W.Burns and Paul. J. Bottino, Macmillan Publishing Company New York. Collier Macmillan Publishers, London.
9. Cytology and Genetics, 1990. V.R.Dnyansagar Tata McGraw-Hill Pu Publishing Company, New Delhi.

10. The Science of Genetics- An Introduction to heredity, 1976, George.W.Burns, Macmillan Publishing Co.Inc.New York.
11. Cytogenetics and Evolution, 1988, R.S.Shukla and P.S.Chandel, S.Chand and Company (Pvt)Ltd. New Delhi.
12. Genetics, - A survey of the Principles of heredity, 1967, A.M.Winchester, Oxford and IEH publishing Co. New Delhi. Bombay.
13. Genetics, 1990, C.Sarian.Tata McGraw-hill publishing Company, New Delhi.
14. Essentials of cytology, 1983, C.B.Powar, Himalaya Publishing House, Bombay.
15. Principles of Genetics, 1972, Eldon. J. Gardner Wiley Eastern, New Delhi.
16. Genetics, 1975, Prem Singh Verma and Vinod Kumar Agarwal. S. Chand and Co.(Pvt)Ltd. New Delhi.
17. Genetics, 1987, Mohan P.Arora and Gardar Shan.S.Sandhu. Himalaya Publishing House, Bombay, Nagpur, Delhi.
18. A Text book of Genetics, 1974, by Dr.R.C.Dalela and Dr.S.R.Verma.Jai Prakash Nath & Co.Meerut.
19. Genetics, 1990, by Karvita.B.Ahluwalia.Wiley Eastern Limited-New Delhi.

PAPER III : PRACTICALS

- Practical No.1 : Preparation of Paramecium culture (E)
- Practical No.2 : Study of different organelles of Paramecium with help of vital dye/dyes to observe the nuclei, cilia, food vacuoles and contractile vacuoles (E)
- Practical No.3. : a) Study of Cyclosis and Trichocyst in Paramecium (E)
b) Study of Conjugation and Binary fission in Paramecium (D)
c) Study of Paramecium in response to various stimuli (acid, alkali, light and electric current) (E)
- Practical No.4. : Study of Hydra :
a) W.M., W.M. with testis, W.M. with ovary, and W.M. with Bud (D).
b) T.S. of Hydra passing through the Testis and ovary (D)
- Practical No.5. : 1) Study of external characters of Earthworm (E)
2) Dissection of Earthworm so as to study the Digestive system (E).
- Practical No.6. : Dissection of Earthworm so as to study the Reproductive system (E).
- Practical No.7. : Dissection of Earthworm so as to study Nervous system (E).
- Practical No.8. : a. Observation of major blood vessels and lateral heart of Earthworm (E)
b. Mounting of Setae, septal nephridia, Blood gland and Ovary of Earthworm (E).

- Practical No.9. : Study of Histology of Earthworm :
T.S. passing through pharynx, Gizzard, Gonads
and Typhlosole (D)
- Practical No.10. : Study of Amphioxus :
W.M., T.S. passing through : oral hood,
pharynx, Gonads, Intenstine and caudal
region (D)
- Practical No.11. : Study of Amphioxus embryology :
Egg, Blastula and Gastrula (D).
- Practical No.12. : Study of Axial skeleton of frog :
skull, articulated bones of skull and
vertebrae (D).
- Practical No.13. : Study of Appendicular skeleton of Frog :
pectoral girdle, pelvic girdle, bones of
fore limbs and hind limbs (D).
- Practical No.14. : Dissection of Frog/Toad
i) External characters and Sexual dimorphism
(D).
ii) Digestive system (D)
iii) Circulatory system (D)
iv) Reproductive system (D)
(Urinogenital system)
v) Nervous system (D)
- Practical No.15. : Estimation of dissolved oxygen from given
water sample by modified Winkler's method (E)
- Practical No.16. : Estimation of dissolved carbon dioxide
from a given sample water (E)
- Practical No.17. : Study of fauna from polluted and non
polluted water sample.
- Practical No.18. : Compulsory visit to polluted river, pond,
lake or polluted location and water.

Purification plant or effluent treatment plant of any industry.

Practical No.19

Study of Drosophila :

E.characters, sexual diamorphism in adult, and life cycle.

Mutants :- Eye mutation and wing mutation (D)

Practical No.20

Study of ABO blood group system and human genetic traits such as ear lobes, rollers non-rollers, colourblindness, wido's peak, Testers and nontesters (E)

Practical No.21.

Study of human karyotypes from metaphage chromosome spread of normal male/female (E)

Practical No.22

Study of embryology of Frog :
Egg, Blastula, Gastrula, neural tube, furmation (D)

Practical No.23.

Frog Metamorphosis :

Tadpole with sucker, external gills, internal gills and coiled interstine, Hindlimb stage, Tadpole with two pairs of limbs and adult frog (D).

REFERENCE BOOKS (PRACTICALS)

1. A manual of Practical Zoology- Invertebrates, 1971
P.S.Verma, S.Chand & Co. (Pvt) Ltd. - Delhi.
2. Practical Invertebrate Zoology, 1970-71, V.P.Agarwal,
R.C.Dalela, Jai Prakash Nath & Co. Educational Publishers
- Meerut City.
3. Practical Invertebrate Zoology, U.S. Shrivastava, Central
Book Depot, Allhabad.
4. Introductory Practical Zoology, 2nd Edition, 1992-93,
Dr.S.S.Lal, Rastogi Publication.
5. Practical Zoology chordates, P.S.Verma, S.Chand and Co.
Delhi.
6. Laboratory Mannual of Vertebrate Zoology, Dr.V.P.Agrawal
& Dalela, Jai Prakash Nath & Co. Meerut city.
7. An Experimental Approach to Biology, Peter Abramott and
R.G.Thomson, W.H.Freeman and Comp. - Sanfrancisco.
8. Biology, An Inquiry into life, Vol. 1 & 2 1971, Tata
McGraw Hill publishing Co. Ltd.Bombay.
9. Practical cytology, Applied genetics & Biostatistics,
H.K.Goswami, Himalaya Publishing House- Bombay.

UNIVERSITY OF PUNE

Board of Studies in Zoology

Titles of the papers of revised Syllabus

F.Y.B.Sc.

- ZOOLOGY PAPER I : Nonchordates and chordates - I
ZOOLOGY PAPER II : Environmental Pollution and Genetics
ZOOLOGY PAPER III : Practical

S.Y.B.Sc.

- ZOOLOGY PAPER IV : Nonchordates and Chordates- II
ZOOLOGY PAPER V : Applied Zoology
ZOOLOGY PAPER VI : Practical

T.Y.B.Sc.

- ZOOLOGY PAPER VII : Nonchordates and Chordates- III
ZOOLOGY PAPER VIII : Histology and Physiology of Mammals.
ZOOLOGY PAPER IX : Cell Biology and Developmental Biology.
ZOOLOGY PAPER X : Molecular Biology and Biological Chemistry.
ZOOLOGY PAPER XI : General Entomology and Parasitology
ZOOLOGY PAPER XII : Animal Ecology and Evolution
ZOOLOGY PAPER XIII : Practical - I
ZOOLOGY PAPER XIV : Practical - II
ZOOLOGY PAPER XV : Practical - III