

University of Pune
Draft of Syllabus with amendments which is to
be implemented from June 2009

This cancels earlier version of syllabus draft
F. Y. B. Sc. Zoology

Paper 1 ZY-101: First term - Nonchordates

Second term - Chordates

Paper 2 ZY-102: First term - Genetics

Second term - Parasitology

Paper 3 ZY-103: Practical course

Paper 1: First term

ZY-101: NONCHORDATES

1. **Scope of Zoology, Introduction to various branches of Zoology:** Physiology, Cell Biology, Biochemistry, Biostatistics, Molecular Biology, Biotechnology, Biophysics, Entomology, Immunology, Aquaculture. **4**
2. **Introduction to classification of living organisms.** **3**
 - 2.1 Systematics- Linnaean Hierarchy (Phylum, class, order, family , genus, species)
 - 2.2 Binominal Nomenclature
 - 2.3 Five Kingdom Classification
3. **Protista.** **5**
 - 3.1 General organization, habits and habitat.
 - 3.2 Classification with major characters of the following
Subphyla (one example each): Opalinata, Ciliophora, Sarcodina, Dinophyta and Euglenophyta
 - 3.3 Study of *Paramoecium* with respect to: habits, habitat, Structure, nutrition, excretion and reproduction (binary fission and conjugation) **5**
4. **Porifera** **4**
 - 4.1 General Organization

4.2 Diversity in sponges: skeletal elements and canal system.	
4.3 Classification with one example of each: Class Calcarea, Hexactinellida, Sclerospongiae and Demospongiae.	
5. Cnidaria-	4
5.1.General organization (including symmetry, alternation of generation and polymorphism)	
5.2. Classification- Hydrozoa, Scyphozoa, Anthozoa .	
5.3.Concept of Coral Reef and its importance.	
6. Platyhelminthes-	3
6.1.General organization, Habit and Habitat.	
6.2. Classification with one example each- Class Turbellaria, Trematoda and Cestoda.	
6.3 Economic importance of Helminthes, regeneration in Planaria.	
7. Annelida-	4
7.1. Diversity in habits and habitat; Classification- Class Polychaeta, Aeolosomata and Clitellata.	
7.2. Vermiculture and its importance, useful species for vermiculture, methods of vermiculture.	
8. General introduction to other invertebrates like: Arthropoda, Mollusca and Echinodermata	2
9. Shell and pearl formation in Mollusca,	2
10. Bioluminescence in invertebrates	1
11. Regeneration and autotomy in Echinodermata	2
12. Mimicry in butterflies	2

Paper I-Second term

ZY-101-CHORDATES

1. Distinctive features and broad classification of Phylum Hemichordata and Phylum Chordata (subphyla-Urochordata, Cephalochordata, Vertebrata)	4
2. General organization of Cyclostomata:	4

- habits and habitat of Petromyzon and Myxine along with their importance.
3. Fishes (Pisces): general organization, economic importance , migration. 4
 4. Evolution and adaptive radiation of reptiles during Mesozoic era; Extinction of Dinosaurs 4
 5. General adaptations for aerial mode of life in birds 2
 6. Egg laying and Marsupial mammals 2
 7. Diversity and adaptive radiation of placental mammals 4
 8. **Study of Frog:** systematic position, habits , habitat, external characters; sexual dimorphism, digestive, circulatory(lymphatic system not expected), respiratory, central nervous system and reproductive systems of male & female.

20

Paper II-First Term

ZY 102-GENETICS

1. **Introduction to genetics** 3
 - 1.1 Recapitulation of Mendelian Genetics and its practical applications, Mendelian laws, Back cross
2. **Multiple Alleles** 4
 - 2.1 Concept of multiples alleles, coat color in Rabbit, ABO & Rh Blood group system
 - 2.2 Concept of multiple genes (polygenic inheritance) with reference to skin color in man
 - 2.3 Concept of pleiotropy
3. **Gene Interaction** 8
 - 3.1 Concept of gene interaction, co-dominance and incomplete dominance
 - 3.2 Complementary factors (9:7)
 - 3.3 Supplementary Factors (9: 3:4)
 - 3.4 Inhibitory factors (13:3)
 - 3.5 Duplicate dominant factors (15:1)
 - 3.6 Lethal genes (dominant and recessive)

4. Chromosomes	5
4.1 Introduction to morphology, composition and classification based on the centromeric position, types of chromosome (autosomes, sex chromosome, polytene and lampbrush chromosomes)	
4.2 Chromosomal aberrations: numerical and structural	
5. Sex- determination	4
5.1 Chromosomal: XX-XY, ZZ-ZW, XX-XO methods, Haploid-Diploid Parthenogenesis, Gynandromorphy	
5.2 Environmental – Sex determination in <i>Bonellia</i>	
6. Human genetics	5
6.1 Preparation and analysis of human karyotype	
6.2 Syndromes- autosomal - Down's (Mongolism), Patau's , Edward and Cri du chat sex chromosomal abnormalities in man: Klinefelter and Turner syndrome	
6.3 Inborn errors of metabolism: albinism, phenylketonuria, alkaptonuria	
7. Sex linked inheritance in human	3
7.1 Colorblindness, Haemophilia and hypertrichosis	
7.2 Sex-influenced genes- Pattern baldness in human	
8. Cytoplasmic inheritance	2
8.1 Kappa particles in <i>Paramecium</i>	
9. Application of genetics	6
9.1 Genetic counseling.	
9.2 Eugenics.	
9.3 Concept of cloning and transgenic animals	
9.4 DNA Fingerprinting and gene therapy	

Paper II- Second Term

ZY 102: PARASITOLOGY

1. Introduction, scope and branches of parasitology 2
Definition : host, parasite, vector, commensalisms, mutualism and parasitism.
2. Types of parasites: ectoparasites, endoparasites and their subtypes. 3
3. Types of hosts : intermediate and definitive, paratenic, reservoir. 3
4. Host – parasite relationship : Host specificity – definition, structural specificity, physiological specificity and ecological specificity. 3
5. Parasitic adaptations : In ectoparasites and endoparasites 3
6. Life cycle, pathogenicity and control measures:
Plasmodium vivax, *Entamoeba histolytica*,
Fasciola hepatica, *Taenia solium*, *Wuchereria bancrofti*
Ascaris lumbricoides. 16
7. Study of the following parasites with reference to morphology, life cycle, pathogenicity and control measures: Head louse, Mite (*Sarcoptes scabiei*). Parasitological significance of domestic, wildlife and zoonosis: Bird flu, Anthrax, Rabies and Toxoplasmosis
10
8. Human defense mechanism: Immunity (natural, acquired) 2

Paper III ZY-103: Practical Course

Revised F.Y.B.Sc. Zoology Syllabus

Practicals

Minimum of 25 practicals are to be performed by students

1. Study of : *Amoeba*, *Paramoecium*, *Trypanosoma*, *Balantidium*/ *Opalina* (D) with the help of slides and live specimens.
2. Study of fresh water sponges and gemmules and spicules (D)
3. Study of hydra, jellyfish, sea anemone and one coral
4. Classification of phylum Annelida (one example from each class)
5. Study of of live *Balantidium* , *Vorticella*, *Carchesium* and *Stentor* from fresh water (E)
6. Culturing of *Paramoecium*/ *Daphnia*/Rotifers and study of binary fission and conjugation and cyclosis in *Paramoecium* (E)

7. Study of cockroach: External characters and sexual dimorphism and Dissection of digestive system of cockroach (E)
8. Cockroach: Dissection of female reproductive system(E)
9. Cockroach: Dissection of male reproductive system (E)
10. Mounting from cockroach: cornea, thoracic spiracles, gizzard(E)
11. Study of monohybrid and dihybrid ratio providing hypothetical data and deducing applicability of Mendelian laws and problems based on theory topics 1,2,3.
12. Culturing *Drosophila* using standard methods (E)
13. Study of external characters and sexual dimorphism in *Drosophila* (E)
14. Study of mutants of *Drosophila* (eye and wing mutants)
15. Study of normal human karyotype from metaphasic chromosomal spread picture (normal male and female) (E)
16. Study characters and karyotypes of syndromes like: Down, Klinefelter and Turner (D).
17. Study of genetic traits in human beings (tongue rolling, widow's peak, ear lobes, colour blindness, PTC taster / non taster)
18. Study of Cyclostomata: *Petromyzon* and *Myxine*
19. Study of frog : External characters and sexual dimorphism (D)
20. Study of Frog: Digestive system (D) and dorsal and ventral view of brain of Frog (D)
21. Study of Frog: Urinogenital systems male/female (D)
22. Study of Frog : Axial skeleton
23. Study of Frog : Appendicular skeleton
24. Study of Frog : Development (egg, blastula, gastrula sections) and metamorphosis (D)
25. Study of *Fasciola hepatica* and *Ascaris lumbricoides* : External characters and life cycle
26. Study of Parasites/Diseases/causative organism of medical importance : *Plasmodium*, *Wuchereria*, *Ascaris*, head louse , Mite (D)
27. Study of insects vectors : house fly , rat flea, mosquito (D)
28. Study of blood groups in human (ABO and Rh) (E)
29. Study of live cercaria and redia from fresh water snail (E)
30. Study of rectal parasites of cockroach / frog.

Reference Books for F.Y.B.Sc. Zoology

1. The Frog – its reproduction and development. By Robert Rugh, Tata McGraw Hill Edition, New Delhi
2. Invertebrate Structure and Function. by EJW Barrington, ELBS, III Edition
3. Biology of Animals. By Ganguly, BB., Sinha, A.K., Adhikari, S., New Central Book Agency, Kolkata
4. Arthropod Phylogeny. By Gupta, A.P., van Nostrand Co., New York
5. Introduction to Amphibia. By Bhamrah, MS and Juneja, K., Amol Publications, Delhi
6. Life of Vertebrates. Young, JZ., III Edition, Clarendon Press, London
7. General Zoology. By Goodnight and others, IBH Publishing Co.,
8. Life of Invertebrates. By Prasad, ASN. Vikas Publishing House, New Delhi
9. Textbook of Vertebrate Zoology. By Prasad, SN and Kashyap, V., New Age India Publishers, New Delhi
10. Modern Text-Book of zoology, Vertebrates. By Kotpal, RL., Rastogi and Co., Meerut
11. Phylum Protozoa to Echinodermata (series) by Kotpal, RL. Rastogi and Co., Meerut
12. Fish and Fisheries of India. By Jhingran, JG. Hindustan Publishing corporation, New Delhi
13. Animal Diversity. By Kershaw, DR. Redwood Burn Ltd, Trowbridge.
14. Text-Book of Zoology. By Parker J. and Haswell, W., ELBS Edition
15. Text-Book of Zoology. By Vidyarthi, Agrasia Publishers, Agra.
16. Chordate Zoology. By Jordan EL and Verma PS. S. Chand and Co., New Delhi
17. Functional Organization of Chordate (parts I and II) Nigam, HC and Sobti, R., S. Chand and Co., New Delhi
18. Invertebrate Zoology. By Barnes, Saunders College Publishing Co., Philadelphia, USA, 1987
19. Genetics. By Verma, PS and Agarwal, VK., S. Chand and Co., New Delhi
20. Principles of Genetics. By. Sinnott, Dunn and Dobzhansky, Tata McGraw Hill, New Delhi India.
21. Genetics. By Gupta, PK., Rastogi Publications, Meerut
22. Genetics. By Sarin, C., Tata McGraw Hill, New Delhi.

23. Principles of Genetics. By Gardner, EJ, Simmons, MJ and Snustad, DP. John Wiley and Sons
24. Introduction to Parasitology. By Chandler and Reid..
25. Parasitology. By Chatterjee, KD...
26. Essentials of Parasitology, Gerald D. Schmidt, 4th Edition. Universal Book Stall, New Delhi 1990 reprint
27. An Introduction to Parasitology By Bernard E Mathews, Cambridge University Press, 1998
28. Parasitology. By Noble ER and Noble GA, Lea and Febiger, Philadelphia, USA, 1976
29. Textbook of Parasitology. By Kochhar SK, Dominant Publishers and Distributors, New Delhi 2004
30. The Invertebrates: A New synthesis. By Barnes, RSK, Calow, P. and Olive, PJW, Blackwell Scientific Publishers, 1988
31. Cytology and genetics. By Dyanasagar, VR. Tata McGraw Hill Pub. Co. Ltd., New Delhi 1992 reprint
32. Essential Genetics. By Lynn Burnet, Cambridge University Press, 1989
33. Genetics. By Ursula Goodenough, 3rd Edition, Saunders College Publishing, 1984
34. The Invertebrates: Function and Form. By Sherman W and and Sherman VG, 1976, Pearson Education Low Priced Edition, Indian reprint 2007

University of Pune
Skeleton paper & guidelines for examiners for F.Y.B.Sc. Practical
Examination in Zoology

With effect from March 2009

Max. Marks (80)

Time- more than 4 hour

Q.1 Dissect cockroach so as to expose its digestive/male/female reproductive system.(20)

Q.2. Make a temporary preparation of cornea/gizzard/spiracle from cockroach. (08)

Q.3. Identify the following specimens/slides as per the instructions (10)

- i) Identify & describe (Amoeba/Paramoecium/Irypanosoma/Balantidium/ opalina
- ii) Identify & give its peculiarities (fresh water sponge/Gemmule/Spicules).
- iii) Identify & describe (from colenterata)
- iv) Identify & classify (from annelida).
- v) Identify & describe (Binary fission/conjugation slide from paramecium)

Q.4 Identify the following specimen/slides as per instructions (10)

- i. Identify & describe (Cyclostomata)
- ii. Identify the sex with reason (frog/sexual dimorphism)
- iii. Identify & describe the pointed organ from dissected specimen
(Any one visceral organ from frog).
- iv. Identify & describe (Any one bone from frog)
- v. Identify & describe (Any one developmental stage from
Embryology/Metamorphosis).

Q.5. Identify the following specimen/slides as per instructions. (12)

- i) Identify & describe (*Fasciolahepatatica/Ascaris lumbricoides*).
- ii) Identify & describe the pathogenecity (Plasmodium/wuchereria/ Headlouse/Tick
- iii) Identify & describe its role in health of human being (House fly/Rat flea/Mosquito
- iv) Identify & describe (Any one Larval stage from life cycle of faciola/Ascaris).

Q.6.A) Identify the following specimen/slides as per instructions (15)

- a) Identify the blood group with reason & state the blood group to whom it can donate
the blood & from which blood group it can accept the blood
(Any one blood group card)
- b) Identify the mutant & describe it (from Drosophillia).
- c) Identify the sex by giving reasons. (Mate/female Drosophilla.)
- d) Identify & comment upon the human genetic trait
(Any one from roller/Non roller,attached/free earlobe,Taster/Non -taster).
- e) Identify & describe (Metacentric,submetacentric,Acrocentric,Telocentric).

B) Any one genetical problem based on monohybrid & Dihybiid ratio.(05)