

ZOOLOGY

B. Sc. I: Sem I

LIFE AND DIVERSITY OF NON-CHORDATA

There shall be following paper and practical for B.Sc.Part-I Semester One examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory Sessions and 25 practical sessions during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

	Marks
1) Paper-I: Life and diversity of Non-Chordata...	
Theory (Written)	80
Internal assessments	20
2) Practical:	50

Total : 150 Marks

Life and Diversity of Non-Chordata

UNIT-I: 1. Classification of Non-Chordata 2. Phylum Protozoa: General Characters, 3. Type Study: Plasmodium vivax: Structure, Life Cycle 4. Parasitic Protozoan and Human Diseases: Malaria, Amoebiasis, Trypanosomiasis, Leishmaniasis

UNIT-II: 1. Phylum Porifera: General Characters. 2. Type study: Scypha: Habits and habitat, External features, cell types, spicules & Structure and significances of canal system. **3. Phylum Coelenterata:** General Characters, 4. Type study: Metridium: Habits and habitat, External features, Gastrovascular cavity, Mesenteries, Reproduction.

UNIT-III: 1. Phylum Platyhelminthes: General Characters. 2. Type study: Fasciola hepatica: Habits and habitat, External features, Digestive, Excretory, Reproductive system and Life cycle. **3. Phylum Aschelminthes:** General Characters. 4. Type study, Ascaris lumbricoides: Habits and habitat, External features, Digestive, Excretory, Reproductive system and Life cycle.

UNIT-IV: 1. Phylum Annelida: General Characters. 2. Type study: Leech: External features, Digestive, Excretory and Reproductive system. **3. Phylum Arthropoda:** General Characters 4. Type study: Cockroach: Habits and habitat, External features, Digestive system, Respiratory system, Reproductive system.

UNIT-V: 1. Phylum Mollusca: General Characters. 2. Type study: Pila globosa: Habits and habitat, External features (Shell and Body), Digestive, Respiratory and Reproductive system. **3. Phylum Echinodermata:** General Characters. 4. Type study: Asterias: Habits and habitat, External features, Digestive system, Water vascular system.

UNIT-VI: 1. Phylum Hemichordata: General Characters, Body organization of Balanoglossus, Affinities of Balanoglossus, with non-Chordata, and Chordata. 2. Corals, coral-reefs. 3. Parasitic adaptations in Helminthes: Morphological and physiological 4. Larval forms and their significance: Amphiblastula, Planula, Trochophore, Bipinnaria, Brachiolaria,

PRACTICALS: 1 S: Life and Diversity of Non-Chordata

Two practical per week each of 3 period's duration. The Examination shall be of 4 hrs duration and of 50 marks.

1. Observation, Classification up to classes and sketching of the following animals, (Specimens or Models):

- Phylum Protozoa: Plasmodium trophozoite, Euglena, Entamoeba histolytica. ·
- Phylum Porifera: Sycon, Bath sponge, Euplectella. ·
- Phylum Coelenterata: Obelia, Aurelia, Tubipora.
- Phylum Helminthes: Fasciola, Taenia, Ascaris (male & female).
- Phylum Annelida: Nereis, Earthworm, Leech, Aphrodite ·
- Phylum Arthropoda: Prawn, Limulus, Aranea, Scolopendra, Julus, Moth, Mosquito. ·
- Phylum Mollusca: Chiton, Pila, Dentalium, Unio, Octopus.
- Phylum Echinodermata: Antedon, Holothuria, , Echinus, Sea star, Brittle star .
- Phylum Hemichordata: Balanoglossus .

2. Study of Permanent slides:

L.S.Sycon, nematocyst, Ascaris egg, T.S. Ascaris through gonads, T.S.Leech through crop, Compound eye of insect, Radula, Gill lamella and Osphradium of Pila, Scolex and Gravid Proglottid of Taenia.

3. Anatomical Study through Computer Aided Techniques, Video Clipping Models, Photographs and other available resources :

- a) Leech/Earthworm: Alimentary canal, Reproductive system, Nervous system,
- b) Grasshopper/Cockroach: digestive system, Nervous system, Reproductive system
- c) Culture of Paramecium and Volvox (To be given to all students)

- 4. Mountings :**
- a) Mosquito (Aedes, Culex and Anopheles) : wings, legs, mouth part
 - b) Housefly: Mouth parts, legs, wings
 - c) Paramecium and Volvox

Distribution of Marks during Practical Examination: Time : 4 hrs.

- i) Identification and comments on spots (1-8) -
4 specimens, 4 slides 12 Marks
- ii) Labelling of Anatomical diagrams provided (Two)--- 10 Marks
- iii) Permanent stained micro preparation. 8 Marks
- iv) Study tour diary - 4 Marks
- v) Permanent stained micro preparation
Submitted by examinee – 4 Marks
- vi) Certified class record - 5Marks
- vii) Check-list of (20) locally available invertebrate fauna2Marks

vii) Viva- voce - 5 Marks

Total : - 50 Marks

Note: 1) One or two short excursion / study tours are compulsory for observation of animals in their natural habitat.

2) Candidates shall be required to produce at the practical examination the following.

- Practical record book duly signed by the teacher in charge and Certified by the Head of the department as bonafide work of the Candidate.
- Five permanent stained micro preparations.
- Study tour report and field diary duly signed by the teacher.

Reference Books Recommended (All latest editions):

- 1) Hickman, C.P. Jr.F.M. Hickman and L.S.Roberts, Integrated principles of Zoology Mosby College publication St.Louis.
- 2) Ayyar, E.K. and T.N.Ananthakrishnan, Manual of Zoology Vol.I (Invertebrata), Part-I & II S. Viswanathan (Printers and Publishes) Pvt. Ltd. Madras.
- 3) Jordan, E.L. and P.S.Verma Invertebrate Zoology, S.Chand and Co., Ltd. Ram Nagar, New Delhi.
- 4) Parker and Haswell, Text book of Zoology, Vol. I (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi – 110051.
- 5) Waterman, Allyn J. etal., Chordate structure and Function, Mac Millan and Co Newyork.
- 6) S.N.Prasad : Text Book of Invertebrate Zoology.
- 7) Vishwanathan : Invertebrate Zoology.
- 8) Majpuria : Invertebrate Zoology.
- 9) Dhami and Dhami : Non-chordate Zoology.
- 10) Bains Prasad: Indian Zoological memoir. Pila.
- 11) R.L.Kotpal : Modern Text Book of Invertebrate Zoology.
- 12) Malviya M.K. Invertebrate Zoology, by Rajdhool publications.
- 13) S.S.Lal, Practical Zoology, Invertebrate.
- 14) Bhamrah H.S.and Kavita Juneja A text book of Invertebrate Zoology, Anmol Publication Pvt. Ltd., New Delhi.
- 15) Verma and Agarwal Practical Zoology, Invertebrate
- 16) Barnes R.D. Invertebrate Zoology -(W.B. Saunders Co.)
- 17) P.G.Puranik and Thakur, Invertebrate Zoology.

ZOOLOGY

B. Sc.I: Sem II

CELL AND DEVELOPMENTAL BIOLOGY

There shall be following paper and practical for B.Sc.Part-I Semester Two examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory Sessions and 25 practical sessions during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which, 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

Marks 1) Paper-II: Cell and Developmental Biology

Theory (Written)	80
Internal assessments	20
2) Practical:	50

Total : 150 Marks

Cell and Developmental Biology

UNIT-I

1. General organization of Prokaryote and Eukaryote Cell.
2. Ultra structure and functions of, Plasma membrane
3. Ultra structure types and functions of, Endoplasmic reticulum

UNIT-II:

1. Ultra structure and functions of, Golgi complex.
2. Ultra structure and functions of Ribosome.
3. Ultra structure and functions of Mitochondria.
4. Ultra structure and functions of Lysosomes.

UNIT-III:

1. Ultra structure and functions of nucleus and nucleolus.
2. Chromosome and its general organization.
3. Structure of Polytene and Lamp brush Chromosome.

UNIT-IV:

1. Mitosis and its significance.
2. Meiosis and its significance.
3. Gametogenesis: Spermatogenesis and oogenesis.
4. Fertilization: Types of fertilization, Mechanism of fertilization.

UNIT V:

1. Cleavage, and development up to coelome formation in amphioxus.
2. Cleavage, Blastulation and gastrulation up to the formation of three germ layers in Frog, Fate map.
3. Cleavage, Blastulation and gastrulation up to the formation of three germ layers in chick.

4. Extra embryonic membranes in chick: Development and significance.

UNIT-VI:

1. Placentation in mammals: Types and Functions of Placenta.

2. Parthenogenesis: Types and, Significance.

3. Regeneration in invertebrates and vertebrates.

4. Elementary idea of, sources, types and use of Stem cells.

Practicals- Cell and Developmental Biology

I) Cell Biology:

1. Use, care and maintenance of microscope.

2. Bacterial Culture, Gram staining.

3. Permeability tests using erythrocytes.

4. Preparation of Polytene chromosome in Chironomus or Drosophila larva.

5. Preparation of various stages of mitosis in Onion root tip.

6. Preparation of various stages of meiosis in insect's testis.

II) Developmental Biology:

1. Study of stages of Gametogenesis in rat/frog, (Permanent Stained Slides)

2. Study of different of types animal eggs

3. Study of developmental stages (Life Cycle) of Cockroach, Housefly, mosquito, Butterfly, Moth, Frog (Any Four).

4. Sperm in physiological saline using phase contrast optics.

5. Demonstration of developing chick through available resources.

6. Developmental stages of frog: Cleavage, blastula, gastrula, neurula, and tadpoles through available resources.

7. Permanent slides of chick embryos at 24, 36, 48, 72 hrs of incubation.

8. Study of different types of placenta with suitable histological slides or visual diagrams.

Distribution of Marks during Practical Examination: Time : 4 hrs.

i)	Identification and comments on spots (1-8) – 4 Cytological, 4 Embryological	16 Marks
i)	Cytological Preparation	10 Marks
ii)	Comments on given Life Cycle	10 Marks
iv)	Certified class record -	05 Marks
iii)	Submission of photographs of any three crop pests	04 Marks
iv)	Viva- voce	05 Marks

Total:- 50 Marks

Reference Books Recommended (All latest editions):

1) C.B.Pawar ;Cell Biology :

2) Alberts Bray, Lewis, Raff, Roberts and Watman Molecular Biology of the cell
(Garland)

- 3) Balinsky, An introduction to Embryology, (CBS College Publishers)
- 4) Grant: Biology of developing system (Halt, Reihart and Winston.)
- 5) Gilbert: Developmental Biology (Sinauer)
- 6) Puranik P. G., A Text Book of Embryology S. Chand & Co.
- 7) Browder L.W. Erickson C.A. & Williams Developmental Biology, 1992 3rd edition, R J. Saunders // College, Publications, London
- 8) Tyagi, Verma and Agrawal: Chordate embryology.
- 9) Dr.R.A.Malu, et.al Text Book of Cell Biology and Developmental Biology – Shivneri Publishers, Amravati.
- 10) Korak Kanti Chaki, Gautam Kundu, and Supriti Sarkar: Introduction to General Zoology Vol. 1 and Vol.2
- 11) De Robertis Cell and Molecular biology

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