

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-I

### PAPER-I

(Non-Chordates and Chordates)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least Two Questions from each Group.*

*All Questions carry equal marks.*

#### GROUP 'A'

1. Describe the hydrostatic movement in Echinodermata.
2. Give an account of the mechanism of filter-feeding in Polychaeta.
3. What is respiration? Describe the respiratory system of Prawn.
4. Define coelom. Mention the organization of coelom in Annelida.
5. Write notes on any two of the following :
  - (a) Trochophore larva
  - (b) Medusa of obelia colony
  - (c) Tracheal system
  - (d) Lateral line system

#### GROUP 'B'

6. Describe the development, general structure and function of skin.
7. Give an account of the different types of feather found in birds.
8. Discuss the brain of Amphibia and compare it with that of mammals.
9. Give an comparative anatomy of Heart of Amphibia, reptiles and mammals.
10. Write notes on any two of the following:
  - (a) Electroreception
  - (b) Cycloid scales
  - (c) Ventilation
  - (d) Peripheral nerves.

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### EXAMINATION PROGRAMME-2022

#### M.Sc. Zoology, Part-I

Date	Papers	Time	Examination Centre
09.11.2022	Paper-I	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
11.11.2022	Paper-II	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
14.11.2022	Paper-III	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
16.11.2022	Paper-IV	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
18.11.2022	Paper-V	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
21.11.2022	Paper-VI	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
23.11.2022	Paper-VII	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
25.11.2022	Paper-VIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna

**NALANDA OPEN UNIVERSITY**

**M.Sc. Zoology, Part-I**

**PAPER-II**

(Taxonomy, Biodiversity and Conservation)

*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.  
All Questions carry equal marks.*

**GROUP 'A'**

1. Describe the trends in biosystematics in reference to chaemotaxonomy and cytotaxonomy.
2. What do you mean by zoological types? Describe the process of typification.
3. Define zoological nomenclature. Describe the international code of zoological nomenclature.
4. What is taxonomic keys? Discuss the different kinds of taxonomic keys and their merit and demerits.
5. Write notes on any **two** of the following :—
  - (a) Priority species.
  - (b) Genetic diversity
  - (c) Sub-species
  - (d) Taxon

**GROUP 'B'**

6. Give an account of the causes and consequences of biotic variation.
7. Describe the characteristics features and faunal adaptation of marine biome.
8. What is species diversity? Discuss the diversity and its factors influencing biodiversity.
9. What do you mean by wild-life? How does it help in the maintenance of environment.
10. Write notes on any **Two** of the following :—
  - (a) Census of threatened species
  - (b) Zooplankton
  - (c) Tropical forest
  - (d) Desert

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER—III**  
(Ecology, Environmental Biology and Toxicology)  
*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.  
All Questions carry equal marks.*

**GROUP 'A'**

1. What is ecological model ? Discuss the fundamentals of ecological model.
2. Describe the role of predation in nature.
3. Discuss the nich concept with special reference to its ecological significance.
4. Describe the evolution of life-history traits.
5. Write notes on any **Two** of the following:—
  - (a) Mutualism.
  - (b) Intertidal zone
  - (c) Extrinsic mechanism
  - (d) Reproductive value

**GROUP 'B'**

6. What is environmental factors ? Discuss the role of light and pressure on the survival of organism.
7. Explain how animals are adapted with the change in environment.
8. Describe the different types of life-table with example.
9. What do you mean by environmental ethics ? Discuss the environmental act of India.
10. Write notes on any **Two** of the following:—
  - (a) Acid Rain
  - (b) Structural adaptation
  - (c) Resistance
  - (d) Homeostasis

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-IV**  
(Ethology and Evolution)  
*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.  
All Questions carry equal marks.*

**GROUP 'A'**

1. What is parental care ? Describe the parental care in Amphibians.
2. What do you mean by courtship behaviour ? Discuss its advantages and roles in the modes of communication.
3. Define learning behaviour. Describe the conditioning and cognitive behaviour in animals.
4. What is social behaviour ? Explain the social organization of insect with reference to honebees.
5. Write notes on any **Two** of the following:—
  - (a) Floking in Birds
  - (b) Schooling in fishes
  - (c) Host-parasite relations
  - (d) Habitat selection

**GROUP 'B'**

6. Describe the concept of Hardy-Weinberg Law of genetic equilibrium.
7. What is variation ? Discuss the genetic variation of natural population with examples.
8. What do you mean by isolation ? Discuss the patterns of mechanisms of Reproductive Isolation and also mention the role of isolation in evolution.
9. Write an essay on Macro and Micro evolution.
10. Write notes on any **Two** of the following:—
  - (a) New-Dawinism
  - (b) Phylogenetic tree
  - (c) DNA-DNA Hybridization
  - (d) Parapatric species

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प्रायोगिक परीक्षा से सम्बन्धित विस्तृत कार्यक्रम पत्र-V में प्रकाशित होगा

**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-V**  
(Biochemistry)  
*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer any Five Questions. All Questions carry equal marks.*

1. Give an account of significance of active transport.
2. What is glycolysis? Discuss its various steps involved in the glucose metabolism.
3. Discuss about the Hexose monophosphate shunt pathways.
4. Describe the events in initiation and elongation of peptide chain in eukaryotes.
5. Give an account of B-oxidation of fatty acid.
6. Describe the properties and classification of protein.
7. Write notes on:—
  - (a) Enzyme transformation
  - (b) Na<sup>+</sup>K<sup>+</sup> pump
8. What is alkaptonuria? Discuss the symptoms and causes of alkaptonuria.
9. Describe the metabolism and hormonal regulation of Adipose tissue.
10. Write notes on any **Two** of the following:—
  - (a) Operon Concept
  - (b) Prostaglandin
  - (c) Ribozyme
  - (d) Polysaccharides

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-VI**

(Cytogenetics and Microbial Genetics)  
*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.  
All Questions carry equal marks.*

**GROUP 'A'**

1. Describe the sex-chromosome abnormalities of human being and also mention its syndromes.
2. Give an account of the structure and function of Lampbrush chromosomes.
3. Describe the structure and function of eukaryotic chromosomes.
4. Discuss the characterization of human chromosome on the basis of different banding technique.
5. Write notes on any two of the following :—
  - (a) Gene mapping
  - (b) Heterochromatin
  - (c) Chromosome segregation.
  - (d) Polytene chromosome

**GROUP 'B'**

6. Describe the process of transformation in Bacteria.
7. Discuss the genetic regulation of cell division in eukaryotes.
8. Describe the separation of chromosome by flow cytometry.
9. Give an account of finger printing technique of DNA and its application
10. Write notes on any **Two** of the following:—
  - (a) Turner's syndrome
  - (b) Non-ionising radiation
  - (c) Bacteriophages
  - (d) Transduction

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*प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।*

**NALANDA OPEN UNIVERSITY**

**M.Sc. Zoology, Part-I  
PAPER-VII**

(Molecular Biology and Genetics)

*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.*

*All Questions carry equal marks.*

**GROUP 'A'**

1. Describe the two classical experiments which demonstrated the semi conservative mode of DNA replication.
2. What do you mean by splicing? Describe the process of splicing.
3. Give an account of the factors and mechanism of transcription.
4. Describe the processing and polyadenylation in m-RNA.
5. Write notes on any **Two** of the following:—
  - (a) DNA polymerase
  - (b) Promotor sites
  - (c) RNA editing
  - (d) Okazaki fragments

**GROUP 'B'**

6. Describe the process of gene cloning.
7. Discuss the mechanism of translation in prokaryotes.
8. Give an account of the recombination of protein in E.coli.
9. Describe the molecular mechanism of genetic & physical maps of genome.
10. Write notes on any **Two** of the following:—
  - (a) Holiday junction
  - (b) Genetic code
  - (c) Termination
  - (d) Central dogma

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

**NALANDA OPEN UNIVERSITY**

**M.Sc. Zoology, Part-I**

**PAPER-VIII**

(Basic physiology and chemical principles and instrumentation)

*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.*

*All Questions carry equal marks.*

**GROUP 'A'**

1. Give detailed account of prospects of Biochemical energetics.
2. Describe the process of electron transport and release of energy.
3. Discuss the third law of thermodynamics.
4. What is free energy? Mention its role in bio-chemical reaction.
5. Write notes on any **Two** of the following:—
  - (a) HMP-shunt
  - (b) Buffers
  - (c) P<sup>H</sup> scale
  - (d) Energy rich bonds

**GROUP 'B'**

6. What is the use of Cholorimeter? Explain it.
7. Give an account of the idea of ultra-centrifugation.
8. Describe the thin layer chromatography.
9. Discuss the different types of electrophoresis.
10. Write notes on any **two** of the following:—
  - (a) X-ray
  - (b) ESR
  - (c) Radioactive isotopes
  - (d) Photo inhibitors

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।



# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER-IX

(Quantitative Biology and Microbiology)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

1. What do you mean by geometric mean? Discuss the differences between geometric mean and harmonic mean. Also mention their merit & demerit.
2. Define regression. Describe the simple linear regression with a suitable example.
3. What is analysis of variance? Discuss the detail.
4. Define Chi-square test. Explain the assumption and computation method with a suitable data.
5. Write notes on any **Two** of the following:—
  - (a) Poisson distribution
  - (b) Null hypothesis
  - (c) Kurtosis & Skewness
  - (d) Frequency distribution

#### GROUP 'B'

6. What is bio-informatics? Describe the statues of human genome project and also mention the importance of bio-informatics.
7. What do you mean by Microbes? Explain the beneficial activities of microbes in food processing.
8. Describe the symptoms, pathogenesis, mode of infection and control of AIDS.
9. Give an account of the pathogen, mode of infection, treatment of diseases related to the bacterial microbes.
10. Write notes on any **Two** of the following:—
  - (a) Single cell protein
  - (b) Whooping cough
  - (c) Chaperones
  - (d) Trypanosoma

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### EXAMINATION PROGRAMME-2022

#### M.Sc. Physics, Chemistry, Botany, Zoology & Mathematics, Part-II

Date	Papers	Time	Examination Centre
27.01.2023	Paper-IX	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
31.01.2023	Paper-X	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
02.02.2023	Paper-XI	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
04.02.2023	Paper-XII	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
06.02.2023	Paper-XIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
08.02.2023	Paper-XIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
10.02.2023	Paper-XV	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna
14.02.2023	Paper-XVI	2.30 PM to 5.30 PM	Nalanda Open University, 2 <sup>nd</sup> Floor, Biscomaun Bhawan, Patna

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER-X

(Biotechnology)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

1. What is blotting method? Discuss the technique of DNA analysis and applications of this technique also.
2. What is Raman spectroscopy? Describe the design and application of Raman spectroscopy.
3. Describe the principles of electron microscopy. How would you differentiate between SEM and TEM.
4. Give an account of the structure and applications of fluorescence microscopy.
5. Write short notes on any **Two** of the following:—
  - (a) NMR spectroscopy
  - (b) Photo bleaching
  - (c) Radioactive decay
  - (d) Colorimeter

#### GROUP 'B'

6. What is flow cytometry? Explain the principles and application of flow cytometry.
7. Describe the procedure and advantage of thin layer chromatography.
8. Give an account of the various steps of preparation of permanent histological slide.
9. Describe any type of biosensor and also its application.
10. Write notes on any **Two** of the following:—
  - (a) HPLC
  - (b) RIA technique
  - (c) SDS-gel electrophoresis
  - (d) Cation exchangers

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#### M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

#### (A) Annual Practical Counselling Classes Programme

Enrollment No.	Batch	Time 09:30 AM to 05:30 PM			
		Date	Paper	Date	Paper
All Old Students	Z1	15-02-2023	IX – XII	16-02-2023	XIII – XVI
200270001 - 200270290	Z2				
200270291 - 200270590	Z3	25-02-2023	IX – XII	26-02-2023	XIII – XVI
200270591 - 200271400	Z4				

#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM
		Paper	Paper		Paper	Paper
Z1	17-02-2023	IX	X	18-02-2023	XI	XII
Z1	19-02-2023	XIII	XIV	20-02-2023	XV	XVI
Z2	21-02-2023	IX	X	22-02-2023	XI	XII
Z2	23-02-2023	XIII	XIV	24-02-2023	XV	XVI
Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER–XI

(Immunology, Cell & Tissue)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

- Define immune response. Describe the process of acquired immune response.
- Describe the structure and cellular distribution of MHC molecule.
- Give an account of the basic structure and functions of immunoglobulins.
- Give a detailed account of adjuvants and their properties.
- Write notes on any **Two** of the following:—
  - Vaccination
  - Mononuclear phagocytes
  - Haptens
  - Rhesus incompatibility

#### GROUP 'B'

- Discuss the different model of cell membrane.
- Give an account of the active transport across cell membrane.
- Discuss the microtubules in the various forms of cell motility.
- Describe the structure, composition and distribution of Apoprotein.
- Write notes on any **Two** of the following:—
  - Cell signalling
  - Cyclic GMP
  - Adipose tissue
  - Fatty liver

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### M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

#### (A) Annual Practical Counselling Classes Programme

Enrollment No.	Batch	Time 09:30 AM to 05:30 PM			
		Date	Paper	Date	Paper
All Old Students	Z1	15-02-2023	IX – XII	16-02-2023	XIII – XVI
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200270291 - 200270590	Z3	25-02-2023	IX – XII	26-02-2023	XIII – XVI
200270591 - 200271400	Z4				

#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM
		Paper	Paper		Paper	Paper
Z1	17-02-2023	IX	X	18-02-2023	XI	XII
Z1	19-02-2023	XIII	XIV	20-02-2023	XV	XVI
Z2	21-02-2023	IX	X	22-02-2023	XI	XII
Z2	23-02-2023	XIII	XIV	24-02-2023	XV	XVI
Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER-XII

(Parasitology)

*Annual Examination, 2022*

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.*

*All Questions carry equal marks.*

#### GROUP 'A'

1. What is vector? Describe the role of mosquito and house fly in transmission of parasite.
2. Describe the mode of infection, effect on the human host and life-history of *Wuchereria bancrofti*.
3. What causes Kala-azar? Give a detailed description of the causative agent and its preventive measures.
4. What is antigen-antibody reaction? Discuss the role of antigen-antibody reaction in protozoan diseases.
5. Write notes on any **Two** of the following:—
 

(a) Malaria	(b) Antigen Processing
(c) Adaptive immunity	(d) Amoebic dysentery

#### GROUP 'B'

6. Describe the prevention and control of live-stock disease.
7. Give an account of the lymphoid cells and granulocytic cells in the immune system.
8. Discuss the principles, method and procedures of counter immunoelectrophoresis (CIEP)
9. Describe the various classes of antibodies and their biological activities.
10. Write notes on any **Two** of the following:
 

(a) ELISA	(b) Poultry diseases
(c) Lymph nodes	(d) Repetitive antigen

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### M.Sc. ZOOLOGY, PART- II

**ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022**

**Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1**

#### (A) Annual Practical Counselling Classes Programme

Enrollment No.	Batch	Time 09:30 AM to 05:30 PM			
		Date	Paper	Date	Paper
All Old Students	Z1	15-02-2023	IX – XII	16-02-2023	XIII – XVI
200270001 - 200270290	Z2				
200270291 - 200270590	Z3	25-02-2023	IX – XII	26-02-2023	XIII – XVI
200270591 - 200271400	Z4				

#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM
		Paper	Paper		Paper	Paper
Z1	17-02-2023	IX	X	18-02-2023	XI	XII
Z1	19-02-2023	XIII	XIV	20-02-2023	XV	XVI
Z2	21-02-2023	IX	X	22-02-2023	XI	XII
Z2	23-02-2023	XIII	XIV	24-02-2023	XV	XVI
Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER–XIII

(Developmental Biology)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

- Define fertilization. Discuss the chemistry and mechanism of fertilization and also mention its significance.
- Give an account of different patterns of cleavage.
- What is gametes? Discuss the structure of a matured mammalian gametes.
- Describe the components, process and function of vitellogenesis.
- Write notes on any **Two** of the following:
  - Gastrulation
  - Nurulation
  - Semen quality
  - Graafian follicles

#### GROUP 'B'

- What do you mean by metamorphosis? Discuss the physiological and biological changes in amphibian metamorphosis.
- Give an account of the role of ecdysone in insects metamorphosis.
- What is bone marrow? Discuss the different types of bone marrow transplant.
- What is pleuropotency of cells? Explain it during animal development and also its significance.
- Write notes on any **Two** of the following:
  - Nymphs
  - Holometabolous
  - Organogenesis
  - Cell differentiation

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#### M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

#### (A) Annual Practical Counselling Classes Programme

Enrollment No.	Batch	Time 09:30 AM to 05:30 PM			
		Date	Paper	Date	Paper
All Old Students	Z1	15-02-2023	IX – XII	16-02-2023	XIII – XVI
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200270291 - 200270590	Z3	25-02-2023	IX – XII	26-02-2023	XIII – XVI
200270591 - 200271400	Z4				

#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM
		Paper	Paper		Paper	Paper
Z1	17-02-2023	IX	X	18-02-2023	XI	XII
Z1	19-02-2023	XIII	XIV	20-02-2023	XV	XVI
Z2	21-02-2023	IX	X	22-02-2023	XI	XII
Z2	23-02-2023	XIII	XIV	24-02-2023	XV	XVI
Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER-XIV

(Endocrinology)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

1. Describe the chemistry and physiological action of Glucagon.
2. Give an account of the histo-physiology of thyroid gland
3. Describe the structure of pituitary gland and discuss the functions of different hormones secreted by the gland.
4. Describe the biosynthesis and function of adrenal medullary hormones.
5. Write notes on any **Two** of the following:
  - (a) Adrenal cortex
  - (b) Insulin
  - (c) Hypothyroidism
  - (d) Oxitocin

#### GROUP 'B'

6. Describe the biosynthesis and functions of ovarian hormones.
7. Give an account of the mode of hormonal action in the fat and protein metabolism.
8. Describe the biosynthesis and function of different Gastro-intestinal hormones.
9. Give a detailed account of the general principle and mechanism of hormonal action.
10. Write notes on any **Two** of the following:—
  - (a) Cyclic AMP
  - (b) Peptide hormones
  - (c) Semen
  - (d) Prostate

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#### M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

#### (A) Annual Practical Counselling Classes Programme

Enrollment No.	Batch	Time 09:30 AM to 05:30 PM			
		Date	Paper	Date	Paper
All Old Students	Z1	15-02-2023	IX – XII	16-02-2023	XIII – XVI
200270001 - 200270290	Z2				
200270291 - 200270590	Z3	25-02-2023	IX – XII	26-02-2023	XIII – XVI
200270591 - 200271400	Z4				

#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM		11:00 AM to 02:00 PM	02:30 PM to 05:30 PM
		Paper	Paper		Paper	Paper
Z1	17-02-2023	IX	X	18-02-2023	XI	XII
Z1	19-02-2023	XIII	XIV	20-02-2023	XV	XVI
Z2	21-02-2023	IX	X	22-02-2023	XI	XII
Z2	23-02-2023	XIII	XIV	24-02-2023	XV	XVI
Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER–XV

(Applied Entomology)

Annual Examination, 2022

**Time: 3 Hours.**

**Full Marks: 80**

*Answer five questions in all, selecting at least Two Questions from each Group.*

*All Questions carry equal marks.*

#### GROUP 'A'

1. Describe the structure, composition and function of cuticle in insects.
2. Describe the male and female reproductive organs in insects.
3. Discuss the process of circulation of blood in insects.
4. Write an essay on 'Insect-host plant interaction.'
5. Write notes on any **Two** of the following:
 

(a) Mouth parts of cockroach	(b) Hatching
(c) Aquatic respiratory organs	(d) Malpighian tubule

#### GROUP 'B'

6. Describe the role of chemicals in pest management.
7. Discuss the life-cycle of two pests of vegetables and their control.
8. Define insecticide. Explain the types & uses of insecticide.
9. Describe the classification and nomenclature of insect pests.
10. Write notes on any **Two** of the following:
 

(a) Caterpillar	(b) Legal control of Pests
(c) Lemon butter fly	(d) Pests of coffee

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### M.Sc. ZOOLOGY, PART- II

#### ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

#### (A) Annual Practical Counselling Classes Programme

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#### (B) Annual Practical Examination Programme

Batch	Date	Time		Date	Time	
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Z3	27-02-2023	IX	X	28-02-2023	XI	XII
Z3	01-03-2023	XIII	XIV	02-03-2023	XV	XVI
Z4	03-03-2023	IX	X	04-03-2023	XI	XII
Z4	05-03-2023	XIII	XIV	06-03-2023	XV	XVI

# NALANDA OPEN UNIVERSITY

## M.Sc. Zoology, Part-II

### PAPER-XVI

(Ichthyology and Inland Fisheries)

Annual Examination, 2022

Time: 3 Hours.

Full Marks: 80

Answer five questions in all, selecting at least Two Questions from each Group.

All Questions carry equal marks.

#### GROUP 'A'

1. Describe the digestive system of fishes in relation to their food & feeding habits.
2. Describe the structure and function of acoustic-lateralis system in fishes.
3. Give an account of the air-breathing organs a catfish *clarias batrachus*.
4. Describe the development of fertilized egg of any fish upto the hatching of embryo.
5. Write notes on any two of the following :
  - (a) Weberian ossicles
  - (b) Gill ventilation
  - (c) Branchial gland
  - (d) Herbivorous fishes

#### GROUP 'B'

6. Describe the Prawn culture in India and add a note on environmental issues in Prawn culture in India.
7. Describe the fish diseases caused by virus and crustaceans and their treatment.
8. Give an account of the inland crafts & gear used in fish capture.
9. Describe the technique of induced breeding and its significance.
10. Write notes on any **two** of the following:
  - (a) Polyculture
  - (b) Weed fishes
  - (c) Pond fertilizers
  - (d) Estuaries

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#### M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2022

Venue : 1st Floor, Zoology/Botany Lab, Biscomaun Tower, Patna-1

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#### (B) Annual Practical Examination Programme

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