

NALANDA OPEN UNIVERSITY

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

(Non-Chordates and Chordates)

Annual Examination, 2021

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 an account of respiratory pigment in invertebrates.
2. Describe Ciliary and flagellar movement in Protozoa.
3. Give an account of evolutionary significance of different larval forms of invertebrates.
4. Describe hydrostatic movement in Coelenterates.
5. Write notes on any two of the following :
 - (a) Nephridia
 - (b) Pseudo Coelomate
 - (c) Acoelomate
 - (d) Botryoidal tissue

GROUP 'B'

6. Describe the different epidermal glands found in Vertebrates.
7. Describe the affinities of Balanoglossus.
8. Classify living Reptiles upto orders with important characters with examples.
9. Describe the different air-sacs found in Birds
10. Write notes on any two of the following:
 - (a) Clenoid Scale
 - (b) Ampula of Lorengini
 - (c) Echidna
 - (d) Sea-horse

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EXAMINATION PROGRAMME-2021 M.Sc. Zoology, Part-I

| Date | Papers | Time | Examination Centre |
|------------|------------|--------------------|--|
| 08.06.2022 | Paper-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 10.06.2022 | Paper-II | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 13.06.2022 | Paper-III | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 16.06.2022 | Paper-IV | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 18.06.2022 | Paper-V | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 20.06.2022 | Paper-VI | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 22.06.2022 | Paper-VII | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 24.06.2022 | Paper-VIII | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-I

PAPER-II

(Taxonomy, Biodiversity and Conservation)

Annual Examination, 2021

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 application of biosystemetic in biology.
2. Describe the various category of species.
3. Describe different types of biodiversity.
4. Which is the rule of Zoological nomenclature? Write a short note on international code of Zoological nomenclature.
5. Write notes on any **two** of the following :—
 - (a) captive breeding.
 - (b) Intraspecific species
 - (c) Taxon
 - (d) Genetic diversity

GROUP 'B'

6. Describe wild life Conservation in India.
7. Describe characteristics and adaptation in forest biomes.
8. Describe the characteristic features of faunal adaption of merine biomes.
9. Why would it be unethical to destroy wild animals?
10. Write notes on any **Two** of the following :—
 - (a) Core Zone
 - (b) Zooplankton
 - (c) Ex situ
 - (d) Census of Threatened species

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER—III
(Ecology, Environmental Biology and Toxicology)
Annual Examination, 2021

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 different types of Competition found in Nature.
2. Describe the role of predation in nature.
3. Describe the different categories of mutualism. How mutualism is evolved in nature.
4. Describe Nitrogen Cycle in detail.
5. Write notes on any **Two** of the following:—
 - (a) Predation
 - (b) Intertidal Zone
 - (c) Niche Concept
 - (d) Pyramid of energy.

GROUP 'B'

6. Describe the impact of temperature on various life processes.
7. How do human interfere with carbon cycle.
8. Discuss the environmental stress on animal.
9. What is competitive exclusion principles.
10. Write notes on any **Two** of the following:—
 - (a) Mountain Sickness
 - (b) Estuaries
 - (c) Acid Rain
 - (d) Oxygen toxicity

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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-IV

(Ethology and Evolution)

Annual Examination, 2021

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 an account of social organization of insects giving example of honeybees.
2. Describe the types and role of signal in communication among animals.
3. What do you mean by Parental Care ? Discuss parental care in Amphibians.
4. Define learning and give an account of types of learning.
5. Write notes on any **Two** of the following:—
 - (a) Biological clock
 - (b) Navigation
 - (c) Habitat Selection
 - (d) Diapause

GROUP 'B'

6. Write an essay on Darwinism.
7. Give an account of Isolating mechanism.
8. Describe the "Hardy-Weinberg' Law" of genetic equilibrium.
9. Write an essay on Micro and Mega evolution.
10. Write notes on any **Two** of the following:—
 - (a) Reproductive Variation
 - (b) Lethal mutation
 - (c) Phylogenetic tree
 - (d) Phenotypic variation

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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-V
 (Biochemistry)
 Annual Examination, 2021

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. Describe oxidation of unsaturated fatty acid.
3. Give an account of biological role of plasma lipoproteins.
4. Describe structure and functions of Carbohydrate.
5. Write notes on the following :—
 - (a) Ketogenesis
 - (b) Hypoglycemia
6. Describe the events in initiation and elongation of peptide chain in eukaryotes.
7. Give an account of β -oxidation of fatty acid.
8. Explain how energy is obtained from metabolism of amino acid.
9. Write an essay on Glycolysis.
10. Write notes on any **Two** of the following:—
 - (a) Ribozyme
 - (b) Lipotropic factors
 - (c) ATP-ADP translation
 - (d) Operon

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REVISED PROGRAMME

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION, 2021

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

(A) Annual Practical Counselling Class

| Enrollment No. | Batch | Time: 09:30 AM TO 05:30 PM | | | |
|---|-------|----------------------------|--------|------------|----------|
| | | Date | Paper | Date | Paper |
| All Old students & (200270001-200270050) | Z1 | 25.06.2022 | I - IV | 26.06.2022 | V - VIII |
| (200270051 -200270190) | Z2 | | | | |
| (200270191 -200270345) | Z3 | | | | |
| (200270346 -200270465) | Z4 | 06.07.2022 | I - IV | 07.06.2022 | V - VIII |
| (200270466 -200270590) | Z5 | | | | |
| (200270591 -200271165) | Z6 | | | | |
| (200271165 -200271300) | Z7 | 19.07.2022 | I - IV | 20.07.2022 | V - VIII |

(B) Annual Practical Examination 2021

| Date | Time | | | | | |
|------------|----------------------|-------|---------------------|-------|--------------------|-------|
| | 08:00 AM to 11:00 AM | | 11:00 AM to 02:00PM | | 02:30 PM to 5:30PM | |
| | Batch | Paper | Batch | Paper | Batch | Paper |
| 27-06-2022 | Z1 | I | Z1 | II | Z1 | III |
| 28-06-2022 | Z1 | IV | Z1 | V | Z1 | VI |
| 29-06-2022 | Z1 | VII | Z1 | VIII | Z2 | I |
| 30-06-2022 | Z2 | II | Z2 | III | Z2 | IV |
| 01-07-2022 | Z2 | V | Z2 | VI | Z2 | VII |
| 02-07-2022 | Z2 | VIII | Z3 | I | Z3 | II |
| 04-07-2022 | Z3 | III | Z3 | IV | Z3 | V |
| 05-07-2022 | Z3 | VI | Z3 | VII | Z3 | VIII |
| 08-07-2022 | Z4 | I | Z4 | II | Z4 | III |
| 09-07-2022 | Z4 | IV | Z4 | V | Z4 | VI |
| 12-07-2022 | Z4 | VII | Z4 | VIII | Z5 | I |
| 13-07-2022 | Z5 | II | Z5 | III | Z5 | IV |
| 14-07-2022 | Z5 | V | Z5 | VI | Z5 | VII |
| 15-07-2022 | Z5 | VIII | Z6 | I | Z6 | II |
| 16-07-2022 | Z6 | III | Z6 | IV | Z6 | V |
| 18-07-2022 | Z6 | VI | Z6 | VII | Z6 | VIII |
| 21-07-2022 | Z7 | I | Z7 | II | Z7 | III |
| 22-07-2022 | Z7 | IV | Z7 | V | Z7 | VI |
| 23-07-2022 | Z7 | VII | Z7 | VIII | xxx | xxx |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-I

PAPER-VI

(Cytogenetics and Microbial Genetics)

Annual Examination, 2021

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'

- With the help of diagram describe the events of alternative splicing that leads to sex determination in *Drosophila*.
- Describe the sex-chromosome abnormalities of human being and also mention its syndromes.
- Describe the methods of heterokaryon selection.
- Write an essay on cell harvesting.
- Write notes on any two of the following :—
 - Chromosomal Puffs
 - Squash preparation
 - Non-disjunction of chromosome
 - Polytene chromosome

GROUP 'B'

- Describe the cytogenetic effects of ionized and non-ionized radiation.
- Describe the genetic regulation of cell cycle in eukaryotes.
- Give an account of finger printing technique of DNA and its application.
- Describe the separation of chromosome by flow cytometer.
- Write notes on any **Two** of the following :—
 - T₄ - phage
 - FISH
 - Bacterial genome
 - F-factor

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REVISED PROGRAMME

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION, 2021

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

(A) Annual Practical Counselling Class

| Enrollment No. | Batch | Time: 09:30 AM TO 05:30 PM | | | |
|---|-------|----------------------------|--------|------------|----------|
| | | Date | Paper | Date | Paper |
| All Old students & (200270001-200270050) | Z1 | 25.06.2022 | I - IV | 26.06.2022 | V - VIII |
| (200270051 -200270190) | Z2 | | | | |
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| (200270346 -200270465) | Z4 | 06.07.2022 | I - IV | 07.06.2022 | V - VIII |
| (200270466 -200270590) | Z5 | | | | |
| (200270591 -200271165) | Z6 | | | | |
| (200271165 -200271300) | Z7 | 19.07.2022 | I - IV | 20.07.2022 | V - VIII |

(B) Annual Practical Examination 2021

| Date | Time | | | | | |
|------------|----------------------|-------|---------------------|-------|--------------------|-------|
| | 08:00 AM to 11:00 AM | | 11:00 AM to 02:00PM | | 02:30 PM to 5:30PM | |
| | Batch | Paper | Batch | Paper | Batch | Paper |
| 27-06-2022 | Z1 | I | Z1 | II | Z1 | III |
| 28-06-2022 | Z1 | IV | Z1 | V | Z1 | VI |
| 29-06-2022 | Z1 | VII | Z1 | VIII | Z2 | I |
| 30-06-2022 | Z2 | II | Z2 | III | Z2 | IV |
| 01-07-2022 | Z2 | V | Z2 | VI | Z2 | VII |
| 02-07-2022 | Z2 | VIII | Z3 | I | Z3 | II |
| 04-07-2022 | Z3 | III | Z3 | IV | Z3 | V |
| 05-07-2022 | Z3 | VI | Z3 | VII | Z3 | VIII |
| 08-07-2022 | Z4 | I | Z4 | II | Z4 | III |
| 09-07-2022 | Z4 | IV | Z4 | V | Z4 | VI |
| 12-07-2022 | Z4 | VII | Z4 | VIII | Z5 | I |
| 13-07-2022 | Z5 | II | Z5 | III | Z5 | IV |
| 14-07-2022 | Z5 | V | Z5 | VI | Z5 | VII |
| 15-07-2022 | Z5 | VIII | Z6 | I | Z6 | II |
| 16-07-2022 | Z6 | III | Z6 | IV | Z6 | V |
| 18-07-2022 | Z6 | VI | Z6 | VII | Z6 | VIII |
| 21-07-2022 | Z7 | I | Z7 | II | Z7 | III |
| 22-07-2022 | Z7 | IV | Z7 | V | Z7 | VI |
| 23-07-2022 | Z7 | VII | Z7 | VIII | xxx | xxx |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-I

PAPER-VII

(Molecular Biology and Genetics)

Annual Examination, 2021

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'

- Describe the history of molecular biology.
- Describe the process of RNA editing in reference to mitochondrial genome.
- what is the role of RNA in DNA replication.
- Describe the process of splicing.
- Write notes on any **Two** of the following:—
 - Proof reading
 - Antiterminator
 - Template
 - Polymerase

GROUP 'B'

- Describe the Procedure of gene cloning.
- Describe the process of DNA repair.
- Differentiate between transcription and translation.
- What do you mean by Chromosome map ? Explain.
- Write notes on any **Two** of the following:—
 - Gene Conversion
 - Sigma factor
 - Reverse Transcription
 - Elongation factor

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REVISED PROGRAMME

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION, 2021

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

(A) Annual Practical Counselling Class

| Enrollment No. | Batch | Time: 09:30 AM TO 05:30 PM | | | |
|---|-------|----------------------------|--------|------------|----------|
| | | Date | Paper | Date | Paper |
| All Old students & (200270001-200270050) | Z1 | 25.06.2022 | I - IV | 26.06.2022 | V - VIII |
| (200270051 -200270190) | Z2 | | | | |
| (200270191 -200270345) | Z3 | | | | |
| (200270346 -200270465) | Z4 | 06.07.2022 | I - IV | 07.06.2022 | V - VIII |
| (200270466 -200270590) | Z5 | | | | |
| (200270591 -200271165) | Z6 | | | | |
| (200271165 -200271300) | Z7 | 19.07.2022 | I - IV | 20.07.2022 | V - VIII |

(C) Annual Practical Examination 2021

| Date | Time | | | | | |
|------------|----------------------|-------|---------------------|-------|--------------------|-------|
| | 08:00 AM to 11:00 AM | | 11:00 AM to 02:00PM | | 02:30 PM to 5:30PM | |
| | Batch | Paper | Batch | Paper | Batch | Paper |
| 27-06-2022 | Z1 | I | Z1 | II | Z1 | III |
| 28-06-2022 | Z1 | IV | Z1 | V | Z1 | VI |
| 29-06-2022 | Z1 | VII | Z1 | VIII | Z2 | I |
| 30-06-2022 | Z2 | II | Z2 | III | Z2 | IV |
| 01-07-2022 | Z2 | V | Z2 | VI | Z2 | VII |
| 02-07-2022 | Z2 | VIII | Z3 | I | Z3 | II |
| 04-07-2022 | Z3 | III | Z3 | IV | Z3 | V |
| 05-07-2022 | Z3 | VI | Z3 | VII | Z3 | VIII |
| 08-07-2022 | Z4 | I | Z4 | II | Z4 | III |
| 09-07-2022 | Z4 | IV | Z4 | V | Z4 | VI |
| 12-07-2022 | Z4 | VII | Z4 | VIII | Z5 | I |
| 13-07-2022 | Z5 | II | Z5 | III | Z5 | IV |
| 14-07-2022 | Z5 | V | Z5 | VI | Z5 | VII |
| 15-07-2022 | Z5 | VIII | Z6 | I | Z6 | II |
| 16-07-2022 | Z6 | III | Z6 | IV | Z6 | V |
| 18-07-2022 | Z6 | VI | Z6 | VII | Z6 | VIII |
| 21-07-2022 | Z7 | I | Z7 | II | Z7 | III |
| 22-07-2022 | Z7 | IV | Z7 | V | Z7 | VI |
| 23-07-2022 | Z7 | VII | Z7 | VIII | xxx | xxx |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-I PAPER-VIII

(Basic physiology and chemical principles and instrumentation)

Annual Examination, 2021

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 are radioactive isotopes ? Discuss its use in treatment of disease.
2. Give detailed account of prospects of Biochemical energetics.
3. Explain how biological energy transducers play an important role in all living organisms.
4. Describe the third law of thermodynamics.
5. Write notes on any **Two** of the following:—
 - (a) Acidic buffer
 - (b) ATP
 - (c) HMP Shunt
 - (d) Energy rich bonds

GROUP 'B'

6. Give an account of different types of Electrophoresis.
7. Write the principle and application of gas liquid chromatography.
8. Give an account of different components of HPLC.
9. Give an account of thin layer chromatography (TLC)
10. Write notes on any **Two** of the following:—
 - (a) Indicator
 - (b) X-Ray
 - (c) Redox Potential
 - (d) Limitation of pH Scale

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REVISED PROGRAMME

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION, 2021

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

(A) Annual Practical Counselling Class

| Enrollment No. | Batch | Time: 09:30 AM TO 05:30 PM | | | |
|---|-------|----------------------------|--------|------------|----------|
| | | Date | Paper | Date | Paper |
| All Old students & (200270001-200270050) | Z1 | 25.06.2022 | I - IV | 26.06.2022 | V - VIII |
| (200270051 -200270190) | Z2 | | | | |
| (200270191 -200270345) | Z3 | | | | |
| (200270346 -200270465) | Z4 | 06.07.2022 | I - IV | 07.06.2022 | V - VIII |
| (200270466 -200270590) | Z5 | | | | |
| (200270591 -200271165) | Z6 | | | | |
| (200271165 -200271300) | Z7 | 19.07.2022 | I - IV | 20.07.2022 | V - VIII |

(D) Annual Practical Examination 2021

| Date | Time | | | | | |
|------------|----------------------|-------|---------------------|-------|--------------------|-------|
| | 08:00 AM to 11:00 AM | | 11:00 AM to 02:00PM | | 02:30 PM to 5:30PM | |
| | Batch | Paper | Batch | Paper | Batch | Paper |
| 27-06-2022 | Z1 | I | Z1 | II | Z1 | III |
| 28-06-2022 | Z1 | IV | Z1 | V | Z1 | VI |
| 29-06-2022 | Z1 | VII | Z1 | VIII | Z2 | I |
| 30-06-2022 | Z2 | II | Z2 | III | Z2 | IV |
| 01-07-2022 | Z2 | V | Z2 | VI | Z2 | VII |
| 02-07-2022 | Z2 | VIII | Z3 | I | Z3 | II |
| 04-07-2022 | Z3 | III | Z3 | IV | Z3 | V |
| 05-07-2022 | Z3 | VI | Z3 | VII | Z3 | VIII |
| 08-07-2022 | Z4 | I | Z4 | II | Z4 | III |
| 09-07-2022 | Z4 | IV | Z4 | V | Z4 | VI |
| 12-07-2022 | Z4 | VII | Z4 | VIII | Z5 | I |
| 13-07-2022 | Z5 | II | Z5 | III | Z5 | IV |
| 14-07-2022 | Z5 | V | Z5 | VI | Z5 | VII |
| 15-07-2022 | Z5 | VIII | Z6 | I | Z6 | II |
| 16-07-2022 | Z6 | III | Z6 | IV | Z6 | V |
| 18-07-2022 | Z6 | VI | Z6 | VII | Z6 | VIII |
| 21-07-2022 | Z7 | I | Z7 | II | Z7 | III |
| 22-07-2022 | Z7 | IV | Z7 | V | Z7 | VI |
| 23-07-2022 | Z7 | VII | Z7 | VIII | xxx | xxx |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER-IX

(Quantitative Biology and Microbiology)

Annual Examination, 2021

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. Define analysis of variance and discuss one way analysis of variance.
2. Describe different types of Correlation.
3. Define probability distribution. Explain different types of probability distribution.
4. Define harmonic and geometric mean and also discuss their merits and demerits.
5. Write notes on any **Two** of the following:—
 - (a) Degree of freedom
 - (b) Partial correlation
 - (c) Standard error
 - (d) Null hypothesis

GROUP 'B'

6. Give an account of Protozoan microbes and also discuss the related diseases.
7. Give an account of elementary ideas of Biostatistics.
8. What do you mean by bio-informatics ?
9. Describe the structure, pathogenesis of mode of HIV infection.
10. Write notes on any **Two** of the following:—
 - (a) Antibodies
 - (b) Symptoms of AIDS
 - (c) Homology and analogy
 - (d) Single cell protein

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EXAMINATION PROGRAMME-2021

M.Sc. Zoology, Part-II

| Date | Papers | Time | Examination Centre |
|------------|------------|--------------------|---|
| 05.07.2022 | Paper-IX | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 07.07.2022 | Paper-X | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 09.07.2022 | Paper-XI | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 13.07.2022 | Paper-XII | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 15.07.2022 | Paper-XIII | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 19.07.2022 | Paper-XIV | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 21.07.2022 | Paper-XV | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |
| 23.07.2022 | Paper-XVI | 2.30 PM to 5.30 PM | Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER-X

(Biotechnology)

Annual Examination, 2021

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 significance of Northern blotting in the study of gene expression.
2. Describe the Working principle of Spectrophotometer giving its two applications.
3. Explain the procedure and advantages of fluorescence method by DNA assay.
4. Discuss the advantage of vacuum blotting over capillary blotting.
5. Write notes on any **Two** of the following:—
 - (a) Radiation detecting devices
 - (b) Florescence resonance energy Transport
 - (c) HIV Virus
 - (d) Stage scanning and Beam scanning

GROUP 'B'

6. Discuss the basic features of HPCL with its application.
7. Give an account of permanent histological slide preparation.
8. What is immunological technique ? Discuss direct and indirect ELISA with Suitable illustrations.
9. What do you understand by transmission electron microscopy ? Discuss its structure and function.
10. Write notes on any **Two** of the following:—
 - (a) Nuclear and plasma stains
 - (b) Write the basic principle of RIA
 - (c) Mounting
 - (d) TLC

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NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER–XI

(Immunology, Cell & Tissue)

Annual Examination, 2021

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 a detailed account of structure of MHC molecules.
2. What are secondary lymphoid organs ? Write a brief account of each of them.
3. Describe Comb's and Gell classification of Hypersensitivity.
4. Give a general properties of Antigen.
5. Write notes on any **Two** of the following:—
 - (a) Natural Killer Cells
 - (b) Macrophase
 - (c) Atopy
 - (d) Mismatched transfusion

GROUP 'B'

6. What do you mean by apoprotein ? Describe in detail.
7. Describe fluid mosaic model of cell membrane.
8. Describe cell movement and intracellular transport.
9. How microfilament and microtubule play their role in cytoskeleton ?
10. Write notes on any **Two** of the following:—
 - (a) Adepose tissues
 - (b) Radial Spokes
 - (c) Cell adhesion
 - (d) Microvilli

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NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER-XII

(Parasitology)

Annual Examination, 2021

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 an account of life cycle of *Anclostoma deodenale*.
2. Describe the role of Antigen-Antibody relation in clinical Parasitology.
3. How does Malaria spread from one man to another and also discuss its control.
4. Give an account of life-cycle of *Entamoeba histolytica*.
5. Write notes on any **Two** of the following:—
 - (a) Sand flies
 - (b) Trophozoid
 - (c) Pathogenesis of kala-azar
 - (d) T-Lymphocytes

GROUP 'B'

6. Describe prevention and Control of Poultry diseases.
7. How do the antibodies act against Pathogens.
8. Write about lymph nodes in the context of immune system.
9. Describe the different types of ELISA and their application.
10. Write notes on any **Two** of the following:—
 - (a) Macrophages
 - (b) Bone marrow
 - (c) Liver fluke
 - (d) Immunoblot

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M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2021

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

(A) Annual Practical Counselling Classes Programme

| Enrollment No. | Batch | Time 09:30 AM to 05:30 | | | |
|--|-------|------------------------|----------|------------|------------|
| | | Date | Paper | Date | Paper |
| All Old Students & 190270001 - 190270070 | Z1 | 25-07-2022 | IX – XII | 26-07-2022 | XIII – XVI |
| 190270071 - 190270240 | Z2 | | | | |
| 190270241 - 190270400 | Z3 | 05-08-2022 | IX – XII | 06-08-2023 | XIII – XVI |
| 190270401 - 190270680 | Z4 | | | | |
| 190270681 - 190271000 | Z5 | 23-08-2022 | IX – XII | 24-08-2022 | XIII – XVI |

(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 | 27-07-2022 | IX | X | 28-07-2022 | XI | XII |
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| Z4 | 17-08-2022 | IX | X | 18-08-2022 | XI | XII |
| Z4 | 20-08-2022 | XIII | XIV | 22-08-2022 | XV | XVI |
| Z5 | 25-08-2022 | IX | X | 26-08-2022 | XI | XII |
| Z5 | 27-08-2022 | XIII | XIV | 29-08-2022 | XV | XVI |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER–XIII

(Developmental Biology)

Annual Examination, 2021

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. Write an essay on the process of spermatogenesis.
2. Give an account of development of extra embryonic membrane in Rabbit and its function.
3. Write an essay on early development of vertebrates.
4. Describe the process of gastrulation.
5. Write notes on any **Two** of the following:—
 - (a) Semination
 - (b) Graffian follicles
 - (c) Neurulation
 - (d) Macrolethal egg

GROUP 'B'

6. Describe the method of bonemarrow transplantation.
7. Describe the role of Juvenil hormone and Ecdysone in insects metamorphosis.
8. Describe the significance of totipotency and pluripotency of cell during animal development.
9. Describe characteristic features of application of Stem Cells.
10. Write notes on any **Two** of the following:—
 - (a) External fertilization
 - (b) Yolk placenta
 - (c) Allantois
 - (d) Copulation

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M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2021

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

(A) Annual Practical Counselling Classes Programme

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| 190270071 - 190270240 | Z2 | | | | |
| 190270241 - 190270400 | Z3 | 05-08-2022 | IX – XII | 06-08-2023 | XIII – XVI |
| 190270401 - 190270680 | Z4 | | | | |
| 190270681 - 190271000 | Z5 | 23-08-2022 | IX – XII | 24-08-2022 | XIII – XVI |

(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 | 27-07-2022 | IX | X | 28-07-2022 | XI | XII |
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| Z3 | 13-08-2022 | XIII | XIV | 16-08-2022 | XV | XVI |
| Z4 | 17-08-2022 | IX | X | 18-08-2022 | XI | XII |
| Z4 | 20-08-2022 | XIII | XIV | 22-08-2022 | XV | XVI |
| Z5 | 25-08-2022 | IX | X | 26-08-2022 | XI | XII |
| Z5 | 27-08-2022 | XIII | XIV | 29-08-2022 | XV | XVI |

NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER-XIV

(Endocrinology)

Annual Examination, 2021

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 Physiological action of insulin and Glucagon.
2. Describe the histology of Adrenal gland and mention the function of hormones secreted by the gland.
3. Describe the process of spermatogenesis and add a note on mammalian sperm.
4. Describe the biosynthesis and functions thyroxin.
5. Write notes on any **Two** of the following:—
 - (a) Acromegaly
 - (b) Cushing's Syndrome
 - (c) STH
 - (d) Oxitocin

GROUP 'B'

6. Describe the role of hormone in Carbohydrate metabolism.
7. Describe the histology of ovary and discuss the functions of ovarian hormones.
8. Discuss the statement "Hormones as messenger".
9. Describe endocrine functions of Testis.
10. Write notes on any **Two** of the following:—
 - (a) Addison's disease
 - (b) Gastrin
 - (c) Menstrual cycle
 - (d) Emergency hormone

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M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2021

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

(A) Annual Practical Counselling Classes Programme

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| 190270071 - 190270240 | Z2 | | | | |
| 190270241 - 190270400 | Z3 | 05-08-2022 | IX – XII | 06-08-2023 | XIII – XVI |
| 190270401 - 190270680 | Z4 | | | | |
| 190270681 - 190271000 | Z5 | 23-08-2022 | IX – XII | 24-08-2022 | XIII – XVI |

(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 | 27-07-2022 | IX | X | 28-07-2022 | XI | XII |
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NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II

PAPER–XV

(Applied Entomology)

Annual Examination, 2021

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 different kinds of Pheromons found in insects.
2. Give an account of metamorphosis in insects.
3. Describe the mouth parts of insects and write a note on their mechanism of feeding.
4. Describe respiration in terrestrial insects.
5. Write notes on any **Two** of the following:—
 - (a) Spiracles
 - (b) Malpighian tubules
 - (c) Chemoreceptor
 - (d) Pest of oil seed crops

GROUP 'B'

6. Describe the life-cycle of two pests of cereals and their control.
7. Describe the methods of chemicals in pest management.
8. Describe the methods of estimation of pest population.
9. Write an essay on "Insect-host plant interaction".
10. Write notes on any **Two** of the following:—
 - (a) Mixed Cropping
 - (b) Migrant pest
 - (c) Predatory Vertebrate
 - (d) Juvenile hormone

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M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2021

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

(A) Annual Practical Counselling Classes Programme

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| 190270401 - 190270680 | Z4 | | | | |
| 190270681 - 190271000 | Z5 | 23-08-2022 | IX – XII | 24-08-2022 | XIII – XVI |

(B) Annual Practical Examination Programme

| Batch | Date | Time | | Date | Time | |
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NALANDA OPEN UNIVERSITY

M.Sc. Zoology, Part-II PAPER-XVI

(Ichthyology and Inland Fisheries)

Annual Examination, 2021

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 air-breathing organs in catfish *Heteropneustes fossilis*.
2. Describe the functional organization telosteam gills.
3. Describe the structure and functions of weberian ossicles.
4. Describe the aquatic resources in reference to riverine fishes of India.
5. Write notes on any two of the following :
(a) Gonado somatic Index (GSI) (b) Chloride Cells (c) Mucus gland

GROUP 'B'

6. What are the objective of fish culture ? Describe fish culture in fresh water.
7. Give an account of Protozoan and fungal diseases in fishes and their cure.
8. Describe induced breeding and add a note on the factors influencing it.
9. Describe the different crafts and gear used in fish capture in marine water.
10. Write notes on any two of the following:
(a) Mahajal (b) Exotic carps
(c) Oceanography (d) Fate of Prawn Culture in India

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M.Sc. ZOOLOGY, PART- II

ANNUAL PRACTICAL COUNSELLING AND PRACTICAL EXAMINATION-2021

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(B) Annual Practical Examination Programme

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