

**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-I**  
(Non-Chordates and Chordates)  
*Annual Examination, 2017*

**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 ciliary and flagellar movement in Protozoa.
2. Give an account of filter-feeding in Polychaeta.
3. Give an account of respiratory pigments in invertebrates.
4. Describe hydrostatic movement in Coelentrates.
5. Write notes on any two of the following :
  - (a) Pseudocoelomate
  - (b) Trochophore larva
  - (c) Book lung
  - (d) Nephridia

**GROUP 'B'**

6. Describe structure and affinities of Balanoglossus.
7. Give a comparative account of heart of Amphibia and Bird.
8. Give an account of derivatives of integuments in vertebrates.
9. Describe the different Components of Blood.
10. Write notes on any two of the following:
  - (a) Sebaceous gland
  - (b) Contour feathers
  - (c) Ctenoid Scale
  - (d) Wheel organ

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**Revised Examination Programme, 2017**  
**M.Sc. Zoology, Part-I**

<b>Date</b>	<b>Papers</b>	<b>Time</b>	<b>Examination Centre</b>
12.05.2017	Paper-I	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
16.05.2017	Paper-II	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
18.05.2017	Paper-III	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
20.05.2017	Paper-IV	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
22.05.2017	Paper-V	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
24.05.2017	Paper-VI	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
26.05.2017	Paper-VII	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna
29.05.2017	Paper-VIII	12.00 Noon to 3.00 PM	MGM College, Kankarbagh Main Road, Patna

**Exam Centre : MGM College, Kankarbagh Main Road, Opposite Chandan Automobiles Hero Showroom, Patna-800020.**

**For Practical Counselling Class & Practical Examination Programme  
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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-II**  
(Taxonomy, Biodiversity and conservation)  
*Annual Examination, 2017*

**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 different kinds of taxonomic keys.
2. Give an account of hierarchy of categories.
3. Describe various category of species.
4. Describe the process of typification.
5. Write notes on any two of the following :-
  - (a) Species Concept
  - (b) Population systematics
  - (c) Genetic diversity
  - (d) ICZN

**GROUP 'B'**

6. Give an account of various theories of biodiversity variation.
7. Give an account of Sample count, linetranset method and plug marking.
8. Describe characteristics and adaptation of forest biome.
9. Describe wild life conservation in India.
10. Write notes on any two of the following :-
  - (a) Benthos
  - (b) Diversity Stability
  - (c) Wild-life Protection Act, 1972
  - (d) Captive breeding

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER—III**  
(Ecology, Environmental Biology and Toxicology)  
*Annual Examination, 2017*

**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. Discuss nich concept with special reference to its ecological significance.
3. Describe the different categories of mutualism. How mutualism is evolved in nature.
4. Describe different types of life tables with examples.
5. Write notes on any **Two** of the following:—
  - (a) Net productive rate
  - (b) Competition
  - (c) Pyramid of energy
  - (d) Predation

**GROUP 'B'**

6. Describe the role of light and pressure on the survival of organism.
7. What do you mean by adaptation ? Describe different aspects of adaptation.
8. Give an account of environmental acts of India.
9. Discuss the environmental stress on animals.
10. Write notes on any **Two** of the following:—
  - (a) Oxygen toxicity
  - (b) Acclimatisation
  - (c) Solar energy
  - (d) Coastal regulation Zone

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-IV**  
(Ethology and Evolution)  
*Annual Examination, 2017*

**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 various aspect of fish migration.
2. What do you mean by Parental Care ? Describe parental care in Amphibians.
3. Give an account of Social Organization of insects, giving example of honeybees.
4. Describe the types and role of signals in Communication among animals.
5. Write notes on any **Two** of the following:—
  - (a) Habitat Selection
  - (b) Intra Sexual Selection
  - (c) Diapause
  - (d) Orientation

**GROUP 'B'**

6. Explain briefly biological species concept and add a note on its limitation.
7. What do you mean by isolation and also discuss isolating mechanism.
8. Write an essay on macro and micro evolution.
9. Give an account of destabilizing force of Neo-Darwinism.
10. Write notes on any **Two** of the following:—
  - (a) Phenotype
  - (b) Lethal mutation
  - (c) Species concept
  - (d) Gene pool

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-V**  
(Animal physiology and Biochemistry)  
*Annual Examination, 2017*

**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 transport of gases in mammals.
2. What type of systems are used for gas exchange in water dwelling animals.
3. Describe the physiological effect of temperature of homoeothermic animals.
4. Give an account of muscle contraction.
5. Write notes on any **Two** of the following:—
  - (a) Ecdysone
  - (b) Pheromone
  - (c) Bohr's Effect
  - (d) Hibernation

**GROUP 'B'**

6. Describe structure and classification of carbohydrates.
7. Describe the different steps of Glycolysis and its energetic.
8. Give an account of biological role of plasma lipoproteins.
9. Give an account of the concept of metabolic pool.
10. Write notes on any **Two** of the following:—
  - (a) Enzyme transformation
  - (b) Operon concept
  - (c) Ribo enzyme
  - (d) Na<sup>+</sup> K<sup>+</sup> pump.

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER-VI**  
(Cytogenetics and Microbial Genetics)  
*Annual Examination, 2017*

**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 methods of heterokaryon selection.
2. With the help of diagram, describe the events of alternative splicing that lead to sex determination in *Drosophila*.
3. Describe structural and functional organization of lampbrush chromosome.
4. Describe the sex-chromosome abnormalities of human being and also mention its syndromes.
5. Write notes on any **Two** of the following:—
  - (a) Non-disjunction
  - (b) Nucleosome organization
  - (c) Squash preparation
  - (d) Polytene chromosome

**GROUP 'B'**

6. Describe the physical mapping of chromosome.
7. Describe the separation of chromosome by flow cytometer.
8. Give an account of fingerprinting technique of DNA and its application.
9. Describe the genetic regulation of cell cycle in eukaryotes.
10. Write notes on any **Two** of the following:—
  - (a) F-factor
  - (b) Transduction
  - (c) Bacteriophage
  - (d) Bacterial genome

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-I**  
**PAPER–VII**  
(Molecular Biology and Genetics)  
*Annual Examination, 2017*

**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 Molecular Biology ? Discuss its important scopes for humans.
2. Explain the mechanism of DNA replication in Eukaryotes.
3. Describe the promoter sites for initiation of transcription in Prokaryotes and Eukaryotes.
4. Describe the process of Splicing.
5. Write notes on any **Two** of the following:—
  - (a) Elongation factor
  - (b) Enhancer sites
  - (c) RNA editing
  - (d) Template

**GROUP 'B'**

6. Describe mechanism of DNA repair.
7. Describe translation process in Prokaryotes.
8. Define gene cloning and discuss the procedure of gene cloning.
9. Describe the recombination of Protein in E.Coli.
10. Write notes on any **Two** of the following:—
  - (a) Translation
  - (b) Chromosome maps
  - (c) RELF
  - (d) Gene Conversion

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NALANDA OPEN UNIVERSITY

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

(Basic physiology and chemical principles and instrumentation)

*Annual Examination, 2017*

**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 the radioactive isotope ? Discuss its uses in the treatment of Diseases.
2. Describe the process of electron transport and release of energy.
3. Discuss the third law of thermodynamics.
4. what is free energy ? Describe its role in bio-chemical reactions.
5. Write notes on any **Two** of the following:—
  - (a) Buffers
  - (b) HMP Shunt
  - (c) Biological Energy Transducers
  - (d) pH Scale

**GROUP 'B'**

6. Discuss the different components of HPCL
7. write the principle and application of Electrophoresis.
8. Describe the mechanism of Photometer.
9. Describe in detail, thin layer chromatography.
10. Write notes on any **Two** of the following:—
  - (a) ESR
  - (b) TLC
  - (c) Indicators
  - (d) X-Ray

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER-IX**  
(Quantitative Biology and Microbiology)  
*Annual Examination, 2017*

**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. Define harmonic and geometric mean and discuss their merits and demerits.
3. Give an account of classification and applications of Biostatistics.
4. Describe different types of regression.
5. Write notes on any **Two** of the following:—
  - (a) Levels of Significance
  - (b) Null hypothesis
  - (c) Standard error
  - (d) Poisson distribution

**GROUP 'B'**

6. Give an account of bacterial microbes and also discuss diseases related to them.
7. Describe Protozoan microbes and also discuss the related diseases.
8. Give an account of elementary ideas of Bio-informatics.
9. Describe the role of microbes in improvement of Soil and in dairy industries.
10. Write notes on any **Two** of the following:—
  - (a) Symptoms of AIDS
  - (b) Homology and Analogy
  - (c) Antibodies
  - (d) Single cell protein

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**Examination Programme, 2017**  
**M.Sc. Zoology, Part-II**

<b>Date</b>	<b>Paper</b>	<b>Time</b>	<b>Examination Centre</b>
01.06.2017	Paper-IX	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
03.06.2017	Paper-X	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
05.06.2017	Paper-XI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
07.06.2017	Paper-XII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
09.06.2017	Paper-XIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
13.06.2017	Paper-XIV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
15.06.2017	Paper-XV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
17.06.2017	Paper-XVI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER-X**  
(Biotechnology)  
*Annual Examination, 2017*

**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 down the Significance of DNA and RNA assay.
2. Give an account of Colorimeter and its application.
3. Describe the working principle of spectrophotometer giving its two applications.
4. What do you mean by Northern blotting ? Discuss its significance in the study of gene expression.
5. Write notes on any **Two** of the following:—
  - (a) Radioisotope and Radioactivity
  - (b) HIV virus
  - (c) Radiation detecting devices
  - (d) Fluorescence resonance Energy Transfer (FRET)

**GROUP 'B'**

6. What is biosensor ? Explain any type of biosensor of your choice.
7. Give an account of principle and applications of flow cytometry.
8. Give an account of permanent histological slide preparation.
9. Discuss the basic feature of HPCL and its application.
10. Write notes on any **Two** of the following:—
  - (a) Labelling of antibodies
  - (b) ELISA
  - (c) Cytological Fixatives
  - (d) TLC

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER–XI**  
(Immunology of Cells and Tissues)  
*Annual Examination, 2017*

**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 role played by biological system in immunogenecity.
2. What are secondary lymphoid organs ? Write a brief account of each of them.
3. Give the general properties of Antigen.
4. Give a detail account of structure of MHC molecules.
5. Write notes on any **Two** of the following:—
  - (a) Mismatched transfusion
  - (b) Organ transplant
  - (c) Hapten
  - (d) Macrophage

**GROUP 'B'**

6. Give an account of active transport across cell membrane.
7. Give an account of the fluidmosaic model of the cell membrane.
8. Describe the basic mechanism of cell signaling.
9. Describe the structure, composition and distribution of Apoprotein.
10. Write notes on any **Two** of the following:—
  - (a) Cell-adhesion
  - (b) Cyclosis
  - (c) Adepose tissue
  - (d) Microvilli

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER—XII**  
(Parasitology)  
*Annual Examination, 2017*

**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 life cycle and pathogenic effects of Entamoeba histolytica.
2. Give an account of life cycle of Leishmania donovani.
3. Describe the history, symptoms, pathogens and control of Malaria.
4. Differentiate between innate and adaptive immunity.
5. Write notes on any **Two** of the following:—
  - (a) B-lymphocytes
  - (b) Trophozoite Stage
  - (c) Filariasis
  - (d) Pathogenesis of Kala-azar

**GROUP 'B'**

6. Describe prevention and control of live-stock diseases.
7. Describe various classes of antibodies and their biological activities.
8. Describe the different types of ELISA and their applications.
9. Write about the lymph nodes in the context of immune system.
10. Write notes on any **Two** of the following:—
  - (a) Natural killer cells
  - (b) Lymphoid cells
  - (c) Immunoblot
  - (d) Macrophages

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<b>For Practical Counselling Class &amp; Practical Examination Programme Please See on Back Page.</b>
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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER–XIII**  
(Developmental Biology)  
*Annual Examination, 2017*

**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 process of spermatogenesis and add a note on the structure of a mammalian sperm.
2. Describe the mechanism of ovum transport in mammal.
3. What is fertilization ? Describe the mechanism of fertilization.
4. Describe the cleavage, blastulation and gastrulation in vertebrates.
5. Write notes on any **Two** of the following:—
  - (a) Ovulation
  - (b) Graffian follicles
  - (c) Semination
  - (d) Vitellogenesis

**GROUP 'B'**

6. Give an account of role of thyroxine in amphibian metamorphosis.
7. Describe the role of Juvenile hormone and Ecdysone in insect metamorphosis.
8. Describe the method of bone marrow transplantation.
9. Describe the significance of totipotency and pluripotency of cell during animal development.
10. Write notes on any **Two** of the following:—
  - (a) Stem cell
  - (b) External fertilization
  - (c) Yolk placenta
  - (d) Ecological metamorphosis

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER–XIV**  
(Endocrinology)  
*Annual Examination, 2017*

**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 histology of Thyroid gland and biosynthesis of Thyroxine.
2. Give an account of histology of Adrenal gland and mention the functions of hormones secreted by adrenal medulla.
3. Describe the chemistry, Synthesis and physiological action of insulin.
4. Describe the chemistry and physiological action of glucagon.
5. Write notes on any **Two** of the following:—
  - (a) Oxytocin
  - (b) STH
  - (c) Gigantism
  - (d) Thyrocalcitonin

**GROUP 'B'**

6. Describe the biosynthesis and function of different gastro-intestinal hormones.
7. Describe the histology of ovary and functions of ovarian hormones.
8. Discuss the statement "Hormone as messenger".
9. Describe role of hormones in Carbohydrate metabolism.
10. Write notes on any **Two** of the following:—
  - (a) Addison's disease
  - (b) Emergency hormone
  - (c) Hyperglycemia
  - (d) Oestrogen

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER–XV**  
(Applied Entomology)  
*Annual Examination, 2017*

**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 mouth parts of insects and their feeding mechanism.
2. Discuss the structure, composition and function of cuticle of insect.
3. Give an account of metamorphosis in insects.
4. Describe the process of respiration in terrestrial insects.
5. Write notes on any **Two** of the following:—
  - (a) Spiracles
  - (b) Pheromones
  - (c) Malpighian tubules
  - (d) Insect-host plant interaction

**GROUP 'B'**

6. Define Pest. Describe various types of insects pests.
7. Describe the methods for estimation of pest population.
8. Describe the role of chemicals in the pest management.
9. Describe the life history and control of pests of vegetables.
10. Write notes on any **Two** of the following:—
  - (a) Pest of rice
  - (b) Carbamates
  - (c) Viviparity
  - (d) Host plants

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**NALANDA OPEN UNIVERSITY**  
**M.Sc. Zoology, Part-II**  
**PAPER–XVI**  
(Ichthyology and Inland Fisheries)  
*Annual Examination, 2017*

**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 air-breathing organs of catfish Heteropneustes fossilis.
2. Describe the structure and function of Weberian ossicles.
3. Describe mechanism of gill ventilation in teleostean gills with special reference to buccal pressure and opercular suction pump.
4. Give an account of air-breathing organs of Anabas testudineus.
5. Write notes on any **Two** of the following:—
  - (a) Gonado somatic index
  - (b) Mucous gland
  - (c) Gill diffusing capacity
  - (d) Channa punctatus

**GROUP 'B'**

6. Describe the ecological status of Estuaries.
7. Describe the control of Physico-chemical factors in management of Fish farm.
8. What are the objective of fish culture ? Describe fish culture in fresh water.
9. Write an essay on cancer of fishes.
10. Write notes on any **Two** of the following:—
  - (a) Long drag net
  - (b) Pond fertilization
  - (c) Cultural species of Prawn
  - (d) Hydrography

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