

## B.Sc Part-3

### Zoology

Scheme:

Max. Marks: 100

Min. Pass Marks: 36

Paper I	3 Hrs duration	33 Marks
Paper II	3 Hrs duration	33 Marks
Paper III	3 Hrs duration	34 Marks
Practicals:	4 Hrs. duration	50 Marks

#### NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 (paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No.2 to 10) in this part, i.e., three from each unit/section out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

#### PAPER -I: Z-301

#### STRUCTURE AND FUNCTIONS OF CHORDATE TYPES

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### Section-A

#### Chordates

1. habit, external features and anatomy of Herdmania
2. Ascidian tadpole larva and its metamorphosis.
3. Habit, habitat and salient features of Petromyzon, Ammocoete larva.

### Section - B

#### Comparative Anatomy

1. Integument including structure and development of placoid scales, feathers and hair.
3. Alimentary canal.
4. Heart and aortic arches.
5. Respiratory system.
6. Urinogenital system.
7. Brain.

### Section - C

#### Chordate Adaptations

1. Amphibia: Parental care.
2. Reptilia: Poisonous and non poisonous snakes, poison apparatus.
3. Aves: Flight adaptations, bird migration.

### PAPER -II: Z-302

### ECOLOGY AND ENVIRONMENTAL BIOLOGY

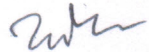
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### Section-A

#### Ecology

1. Basic concepts in ecology, its meaning and history.

  
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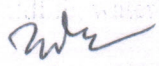
2. Concepts of limiting factors.
3. Ecosystem: Biotic-and abiotic factors.
4. Ecosystem: Production, consumption and decomposition in an ecosystem: Concepts of food-chain, food web, trophic structure, ecological pyramids
5. Biogeochemical cycles of  $O_2$ ,  $CO_2$ ,  $H_2O$ , N, P and role of microbes.
6. Ecosystem: Homeostasis, functional aspects, productivity concepts, ecotone, edge effects, niche.
7. Population ecology: Density and methods of its measurement, natality, mortality, age ratio and distribution, fluctuations, biotic potential, dispersal, growth forms, population interactions and propagation, brief idea of demography.
8. Community ecology: Characteristics of natural communities, structure, composition, stratification.
9. Ecological succession: Types and patterns, concept of climax, details of xerosere and hydrosere successions.
10. Habitat ecology: Brief account of fresh water, marine, terrestrial and estuarine water ecosystems.
11. Major biomes of the world.
12. Ecology and human future: Growth rate role of human kind in modifying natural communities in term of public health and welfare with respect to use of pesticides, conservation and pollution.

### Section - B

#### Environmental Biology-I

1. Environment and its concepts, global environment, hydrosphere, lithosphere and atmosphere.
2. Natural resources: Present status and future needs.
3. Conservation and management of natural resources: Renewable (forest, wildlife, water) and non renewable (soil, minerals and energy).
4. Environmental pollution I: General outline and various types of pollution of water, air, and soil.
5. Environmental pollution II: Sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, pesticides and household pollutants.
6. Green House effect, Ozone layer depletion, El-Nino and La Nina effects and global climate change
7. Radiation and environment: Types of radiation, fallout effects of radiation nuclear accidents.
8. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.

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## Section - C

### Environmental Biology -II

1. Wildlife conservation: Vanishing and threatened animals and plants with special reference in Rajasthan, Wildlife management efforts by Government and non Government organization (including wild life acts).
2. Impact of urbanization: Development and distribution of urban centers, factors , problems and solutions of urbanization, fauna of oriental region.
3. Space ecology: Space ecosystem, space problems and their solutions, colonization.

### PAPER -III: Z-303

### APPLIED ZOOLOGY, ETHOLOGY AND BIostatISTICS

#### NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 (paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, i.e., three from each unit/section out of which candidate will be required to attempt any 4 questions selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

#### Section-A

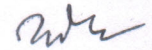
#### Applied Zoology.

Principles and Practices of the following:

1. Sericulture (including ericulture).
2. Lac culture.
3. Apiculture.
4. Prawn culture.
5. Poultry keeping.
6. Pisciculture.

Economic Importance of the following:

1. Protozoa.
2. Helminthes.
3. Arthropods; Insects and their management



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## Section - B

### Ethology

1. Introduction and history of Ethology.
2. Concepts of Ethology : Fixed action pattern, sign stimulus, innate releasing mechanism, action specific energy, motivation imprinting and learning.
3. Methods of studying brain behavior: Neuroanatomical, neurophysiological and neurochemical techniques.
4. Pheromones and their role in alarm spreading
5. Societies: Characteristics and advantage with special reference to honey bee, deer and monkey.
6. Biological rhythms and biological clocks.
7. Methods of studying animal behavior.

## Section - C

### Biostatistics

1. Understanding the concepts of descriptive and inferential statistics.
2. Frequency distribution.
3. Graphical and tabular presentation of data.
4. Mean, median, mode and their significance.
5. Standard deviation, standard error and their significance.

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## Zoology Practical

4 Hrs. /Week

Max. Marks: 50

Min. Marks: 18

### I. Anatomy:

- (a) Study of Any edible fish ( Wallago, Labeo, etc.): External Features, General viscera, afferent and afferent branchial blood vessels, eye muscles and their innervations, brain, cranial nerves and internal ear.
- (b) Rat : Blood vascular, urino-genital and nervous, system (brain, cranial nerves).  
CAL (Computer Assisted Learning may be used with software COMPURAT)

### II. Study of the following through Permanent Slide preparations:

Striped muscle fibers; Smooth muscle fibers scales of edible fish hair of man, dog, goat and cow, blood film of any vertebrate.

- III. Study of Microscopic Slides: whole mounts of oral hood, velum and pharyngeal wall of Amphioxus; T. S. of Amphioxus through various regions; tadpole larva of Asetdia; whole mounts of Salpa, Doliolum and Oikopleura, V. S. of skin of fish, V. S. of skin of bird, V. S. mammalian skin, T. S. mammalian liver, kidney, stomach, intestine, bone, spinal cord, lung, duodenum, pancreas, testis and ovary.

- IV. Study of Museum Specimens: Ascidia, Ciona, Botryllus, Ammocoete larva, Petromyzon, Myxine or Bdellostoma, Zygaena (Sphyrna), Torpedo, Chimaera; Acipenser, Amia or Lepidosteus, Labeo, Clarias, Anguilla, Hippocampus, Exocoetus, Echineis, any flat-fish, Protopterus, Ichthyophis or any blind-worm Proteus, Ambystoma, Axolotl, Siren, A lyles, Hyla, Testudo, Chelone, and Fresh Water Tortoise, Sphenodon, Hemidaetylus Phrynosoma, Draco, Chameleon; Eryx, Hydrophis, Naja. Viper. Crocodilus, Alligator. Axrchaeopter, any Running Bird, Pavo cristatus, Ardeotis nigriceps, Ornithorhynchus, Tachyglossus, Didelphs, Macropus; Bat, Loris, Scaly anteater.

- V. Osteology: A comparative study of articulated and disarticulated bones of any reptile, bird and mammal with the help of models/ charts/ artificial skeleton.

### VI: Environmental Biology:

Analysis of Environment:

1. Soil pH, Methods of ecological census of soil fauna
2. Water analysis: pH, alkalinity, acidity, dissolved O<sub>2</sub> and free CO<sub>2</sub>, Salinity (Chloride).and Hardness.
3. Qualitative estimation of zoo-plankton in given sample of water.

### VII. Ethology:

1. Study of any stored insect pest (food preference and response to light)
2. Antennal grooming in cockroach/Grylus.
3. Habituation in spider

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4. Wing cleaning in house-fly.
5. Excursion / Visit to a Zoo/ Museum of Natural History / Water body / Wild life Sanctuary/ National Park/ Forest Reserve and any industry related to animals / or Study of local faunal biodiversity ( candidates are expected to submit a detailed report of such visits)

#### VIII. Biostatistics:

1. Construction of frequency table, histogram, frequency polygon and pie chart.
2. Exercises on mean, median and mode (direct, short-cut and step-deviation methods).
3. Standard deviation and standard error.

#### Scheme of Practical Examination and Distribution of Marks

Time: 4 hrs.

Min. Pass Marks: 18

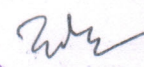
Max. Marks: 50

	Regular	Ex./ N.C. Students
1. Anatomy (any system)	3	4
2. Permanent Preparation	6	6
3. Environmental Biology	7	7
4. Ethology	3	5
5. Biostatistics	5	7
6. Identification and comments on Spots (1 to 8)	16	16
7. Viva Voce	5	5
8. Class Record	5	-
	<b>50</b>	<b>50</b>

#### Notes:

1. With reference to anatomy, study of prescribed types (charts/models), candidates must be well versed in the study of various systems. CD ROMs multimedia computer based simulations including computer assisted learning (CAL) and other soft wares may be used.
2. With reference to permanent preparations and microscopic slides, in case of non-availability, the exercise should be substituted with diagrams, photographs, models, charts, etc.

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3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. The candidates may be asked to write detailed methodology wherever necessary and separate marks may be allocated for the same.
5. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
6. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently Or Necessary permission from chief wild life warden be sought.

#### Recommended Books:

1. Ahsan J and Sinha SP: A Hand book on Economic Zoology. 9th edition S. Chand & Co. Ltd., 1981.
2. Alcock J: Animal Behavior: An Evolutionary Approach. Sinauer Associates 2013.
3. Animal Societies and Evolution. Scientific American Publications.
4. Alexander R. M: The Chordates, Cambridge University Press. 1975.
5. Bailey NTJ: Statistical Methods in Biology. English Universities Press, 1964.
6. Breed MD and Moore J: Animal Behavior. Academic Press. 2015.
7. Grizimek's Encyclopedia of Ethology.
8. Gurumani N: An Introduction to Biostatistics. MJP Publishers, 2011.
9. Hand book of Ethological Method. Laharen Publications Garland STPM Press.
10. Kotpal RL: Modern Text Book of Zoology: Vertebrates. Global Media Publications 2010.
11. MacFarland D: Animal Behavior: Psychobiology, Ethology and Evolution 3rd edition Longman 1998.
12. Mahajan BK: Methods in Biostatistics. 11th edition Jaypee Publishers, 2010.
13. Manning A, Dawkins MS: An Introduction to Animal Behavior. Cambridge University Press 2012.
14. Mathur R: Animal Behavior. Rastogi Publications 2010.
15. Odum: Fundamentals of Ecology. Thomson Books/Cole 2005.
16. Odum: Ecology: A Bridge Between Science and Society Sinauer Associates 1997.
17. Prasad SN and Kashyap V: A Textbook of Vertebrate Zoology. 13th edition Wiley Eastern Ltd. 2011.
18. Primrose S.B. and Twyman R.M: Principles of Gene Manipulation and Genomics. John Wiley & Sons. 2013
19. Rana S. V. S: Environmental Studies. 4th edition. Rastogi Publications 2012.
20. Rastogi VB Organic Evolution 6th edition Kedar Nath Ram Nath Publications. Meerut. Delhi. 1993.
21. Rastogi VB and Jayaraj MS Animal Ecology & Distribution of Animals Kedar Nath Ram Nath Publications, Meerut, Delhi, 1983.
22. Sharma P. D: Environmental Biology and Toxicology. 3rd edition Rastogi Publications, 2013
23. Sunder Rao PSS and Richard J: Introduction to Biostatistics and Research Methods. PHI Publishers, 2012.
24. Sharma P. D: Ecology and Environment. 12th revised edition, Rastogi Publications



2014-2015.

25. Werlance RA: Animal Behavior. Good Year Publishing Co., Inc.
26. Young JZ: The Life of Mammals. Oxford University Press 1970.
27. Young JZ: The life of Vertebrates. 2nd edition Oxford University Press. London 1962.
28. Daniel, D.Chiras, Environment Science. Jones & Barlett Burlington.
29. Mishra, R. Ecology work book. Scientific Publishers Manual, Jodhpur.
30. Trigunayat, M.M. & Kritika Trigunayat, Prayogic Manual Part-3, Scientific Publishers, Jodhpur, Rajasthan.
31. Rastogi V.B. Chordata , Kadar nath , Ram nath, Meerut.
32. Lal, S.S. Practical Zoology (Chordatas). Rastogi Publications, Meerut.
33. सुरेश सिंह: जीव जगत, उत्तरप्रदेश हिन्दी ग्रन्थ अकादमी।

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