



**Swami Ramanand Teerth  
Marathwada University, Nanded**

**B.Sc. III Year – Zoology**

**(ANNUAL PATTERN)**

**With effect from 2010**

**SWAMI RAMANAND TEERTH MARATHWADA  
UNIVERSITY, NANDED  
B.Sc. THIRD YEAR.  
ANNUAL PATTERN  
ZOOLOGY- (NEW) SYLLABUS  
w.e.f. JUNE – 2010**

Sr. No.	Paper No.	Titles of the paper	Periods/ Practical	Marks
1	Paper VIII (Theory)	Ecology, Ethology, Biometry and Bioinformatics	80	100
2	Paper IX (Theory)	<b>Applied Zoology</b> A) Aquaculture and Pisciculture. B) Parasitology C) Entomology D) Environmental science and Environmental pollution.	80	100
3	Paper X (Practical)	Based on Theory paper- VIII		100
4	Paper XI Practical	Based on Theory Paper IX		100
		<b>Total Marks</b>		<b>400</b>

**B.Sc. III Year – Zoology**  
**Annual Pattern – Year 2010-2011**  
**Paper No. VIII**  
**ECOLOGY, ETHOLOGY, BIOINFORMATICS AND BIOMETRY**

**UNIT – I**

1. Introduction to Ecosystem
  - 1.1 Concept of ecosystem
  - 1.2 Components of an ecosystem – Abiotic and Biotic component
  - 1.3 Pond Ecosystem and Desert Ecosystem
2. Atmosphere
  - 2.1 Biosphere
  - 2.2 Impact of ozone layer
  - 2.3 Green house effect
3. Population Ecology – Characteristics of Population
  - 3.1 Population density
  - 3.2 Natality
  - 3.3 Mortality
  - 3.4 Age distribution
  - 3.5 Population growth
4. Ecological Concept of Species
  - 4.1 Ecological species
  - 4.2 Ecoline and ecotypes
  - 4.3 Acclimation and ecological amplitude
  - 4.4 Law of tolerance

**UNIT – II**

1. Pollution – Sources, Effects and Control
  - 1.1 Air Pollution
  - 1.2 Water Pollution
2. Wildlife conservation and endangered species
  - 2.1 Aims of wildlife conservation
  - 2.2 Necessity of conservation
  - 2.3 Management and conservation of wild life
  - 2.4 Endangered species and actions to save endangered species
  - 2.5 Wild life of India
3. Energy Resources
  - 3.1 Conventional energy resources
  - 3.2 Non-conventional energy resources
4. Zoogeographical realms with extent areas – Physical features and fauna
  - 4.1 Ethiopian realm
  - 4.2 Australian realm
  - 4.3 Indian / Oriental realm

### **UNIT – III**

1. Introduction of Animal Behaviour
2. Classification of Animal Behaviour
  - 2.1 Inborn or stereotyped animal behaviour – Taxis, Instincts and Reflexes
  - 2.2 Acquired animal behaviour – Learning behaviour and Reasoning behaviour
3. Social Behaviour in Insects
  - 3.1 Honey bee and Ants
4. Communication Animal Behaviour
  - 4.1 Auditory communication
  - 4.2 Chemical communication
5. Mimicary and Colouration

### **UNIT – IV**

1. Collection of Data, Classification and Tabulation
2. Graphic Representation of Frequency Distribution
  - 2.1 Polygon frequency curve
  - 2.2 Ogive curve
3. Measures of Central Tendency
  - 3.1 Arithmetic Mean, Median and Mode
  - 3.2 Measures of variability – Standard deviation & standard error
4. Computers and Programmes
  - 4.1 Programming languages
  - 4.2 Operating systems
  - 4.3 Internet
  - 4.4 Connectivity
  - 4.5 World Wide Web
  - 4.6 NCBI (National Centre for Biotechnology Information)
  - 4.7 IP Address (Internet Protocol Address)

## References:

- 1) Animal Behaviour – M.P. Arora, Himalaya Publications.
  - 2) Animal Behaviour – Vinod Kumar, Himalaya Publications.
  - 3) Principles of Ecology – Odum, Sunders Publications.
  - 4) Introduction to Bioinformatics – S. Sundara Rajan, R. Balaji, Himalaya Publications.
  - 5) Animal Behaviour – Arumugam, Saras Publications.
  - 6) Evolution & Biostatistics – N. Arumugam, Saras Publications.
  - 7) Biostatistics – S.P. Gupta.
  - 8) Ecology – Arumugam, Saras Publication.
  - 9) Economic Zoology, Biostatistics & Animal Behaviour – Shukla , Mathur, Prasad, Upadhyay.
  - 10) Animal Behaviour, Concepts, Processes and Methods (Wadsworth) – Drickamer & vessey
  - 11) Biology of Animal Behaviour – Grier
  - 12) Introduction to Ethology (Plenum Press ) – Immelmann
  - 13) The Foundation of Ethology – Lorenz
  - 14) An Introduction to Animal Behaviour – Manning
  - 15) Animal Behaviour in Laboratory and Field – Prince and Stoker
  - 16) Ecology , Individuals , Populations And Communities – Begonm, J. L.(Blackwell Science, Oxford, UK)
  - 17) Ecological Concepts – Cherrett J. M. (Blackwell Science, Oxford, UK)
  - 18) Fundamental of Ecological modeling – Jorgensen S. E. (Elsevier, New York)
  - 19) Animal Behaviour: A Synthesis of Ethology & Comparative Psychology – Hinde R. A.( Mcgraw – Hill New York)
  - 20) Bioinformatics – A Biologist Guide to Biocomputing & Internet – Brown, S.M.- Eaton Publishing New York.
  - 21) Fundamental Concept of Bioinformatics – Krane & Raymer, Pearson Education, 2003.
- Introduction to Bioinformatics – Attwood & Parry – Smith, Pearson Education, 2003

**B.Sc. III Year**  
**Applied Zoology**  
**IX (A) Aquaculture and Pisciculture**

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**Unit I**

**1. Introduction to aquaculture**

- i) Scope and importance of aquaculture
- ii) Concepts of extensive, intensive and semi intensive culture practices
- iii) Integrated fish farming – Paddy cum fish culture

**2. Types of aquaculture**

- i) Monoculture and Polyculture
- ii) Pen culture
- iii) Cage culture
- iv) Raceway culture

**3. Sewage fed fish culture**

- i) Composition of sewage
- ii) Treatment of Sewage
- iii) Use in culture

**Unit II**

**1. Aquatic weeds and their control**

- i) Types of weeds
- ii) Advantages and Disadvantages of weeds
- iii) Weed Control – Manual, Mechanical, Chemical and Biological

**2. Man made hazards and Aquaculture**

- i) Domestic Sewage
- ii) Agricultural Sewage
- iii) Industrial Effluents

**3. Characteristics of water**

- i) Physical properties of water
- ii) Chemical properties of water
- iii) Biological properties of water

**Unit III**

**1. Fish farm engineering**

- i) Topography
- ii) Soil type
- iii) Water supply
- iv) Lay out of fish farm

**2. Fish farm management**

- i) Types of ponds for culture
- ii) Preparation and Management of Nursery, Rearing and Stocking Pond.

### **3. Indigenous and Exotic species of fishes and carp culture**

#### **4. Induced Breeding – Hypophysation**

- i) Historical back ground
- ii) Technique of Induced breeding
- iii) Recent trends in induced breeding
- iv) Bundh breeding
- v) Types of Hatcheries

## **Unit IV**

### **1. Fishing Methods**

- i) Crafts and Gears used
- ii) Recent advances in fishing methods – Electrical Fishing, Light Fishing and Fish finder

### **2. Fish diseases**

- i) Parasitic diseases – Symptoms and treatment of
  - a) Fungal
  - b) Protozoan
  - c) Helminth
  - d) Arthropod

#### **Non parasitic diseases**

- i) Environmental fish diseases
- ii) Nutritional diseases

### **3. Fish preservation and processing**

- a) Causes of spoilage of fish
- b) Methods of fish preservation – Salting , Freezing, Freez -drying, Smoking, Drying, Salting and Canning.

### **4. Fish by product**

## Reference Books-

1. Fish and fisheries of India- Jhingran.
2. Fresh water fish pond culture and management – Marilyn Chakroff. Pace crops scientific publishers – Jodhapur.
3. World fish farming cultivation and Economics- E.E. Brown Avt. Publishing Co. U.S.A. 1983.
4. Aquaculture – Bardach J.E. J.H. Ryther and W.O. meharney wiley – India science, New York.
5. Aquaculture- R.J. Reay – Arnold- Heive mann Publishers, India,
6. An Introduction to fishes – S.S. Khanna, Central book Dept. Allahabad.
7. A Manual of fresh water aquaculture – R.Sonthanam, N.Sukumaran and P.Niligajan.
8. A text book of fishery science and Indian fisheries –C.B.C. Shrivastav Kitalb Mahal, Nagpur.
9. Principles of Ecology- P.S. Varma, V.K. Agrawal- S.Chand Publication.
- 10.Elements of Ecology – N.Arumugam, Saras publication, Nagracoil, Kanyakumari.
- 11.Prawn and Prawn fisheries of India- Kurian C.V. and Substian.
- 12.Fish Biology and Indian Fisheries- R.P. Parihar, Central Publishing House, Allahabad.
- 13.Encyclopedia of fishes and fisheries of India- Pandey A.K. and Sandhu.
- 14.Fisheries in India- Misra S.B.
- 15.Fisheries Global Perspective – Cherunilam.
- 16.Fish and fish products – Winton A.L.
- 17.Pond & fish culture - Hall C.B.
- 18.Fishes – Chand Mary
- 19.Fishery Management – Agrawal.
- 20.Costal Aquaculture in India- Santhanam R.
- 21.Marine Fisheries of India- Virbhadrarao and Bal.
- 22.Introduction to fish technology- Regenstein.
- 23.Fresh water fish culture- Wankhede and Deshmukh.
- 24.Aquaculture Development- Amitabh Patel, S.N. Pathak.
- 25.A Text book of Aquaculture- Rao K.R.S.S., Reddy M.S., Discovery Publication, Delhi.

**RAMANANAND TEERTH MARATHWADA UNIVERSITY, NANDED**

**Syllabus (Theory)**

B. Sc. Third year Zoology (Annual pattern)

Applied Parasitology

Paper –IX (B)

Periods – 80

Marks – 100

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**Unit- I**

**Parasitic Protozoa**

**25 Periods**

1. Classification, and general organization of parasitic Protozoa.
2. Geographical distribution, Morphology, Life-cycle, Pathogenicity and control measures of
  - i. *Trypanosoma gambiense*
  - ii. *Giardia intestinalis*
  - iii. *Sarcocystis Sp.*
  - iv. *Balantidium colli*
  - v. *Entamoeba colli.*
  - vi. *Eimeria tenella*
  - vii. *Trycomonas foetus*
  - viii. *Trycomonas vaginalis.*

**Unit -2**

**Parasitic Helminths**

**30 Periods**

1. General characters and classification of parasitic Helminths
2. Geographical distribution, Morphology, life-cycle, Pathogenicity and control measures of –
  - i. *Schistosoma haematobium*
  - ii. *Ganio sp.*
  - iii. *Gastrodiscoides hominis*
  - iv. *Taenia saginata.*
  - v. *Echinococcus granulosus*
  - vi. *Enterobius vermicularis*
  - vii. *Ancylostoma deodenalis*
  - viii. *Wuchereria bancrofti*
  - ix. *Dracunculus medinensis.*
3. Reproductive organs of Trematodes, cestodes and nematodes – A comparative study-
4. Parasitic adaptations In helminthes
5. Host specificity in helminthes
6. Larval forms in helminthes

**Unit – 3**

**Parasitic Arthropods**

**25 Periods**

1. Classification, morphology, pathogenicity and control measures of-
  - i. Ticks and mites.
  - ii. Flies (any four)
  - iii. Syphonoptera.
  - iv. Anopleura and Malophaga.
  - v. Hymenoptera
2. Mosquito as vector in the transmission of Malaria, Dengue fever, Elephantiasis and Yellow fever, and control on mosquitoes.
3. Parasitic Hemiptera – Morphology, Life-history, Pathogenicity and control of *Cimex lacturalis.*

**List of recommended Books.**

1. Animal Parasitism - C.P. Read.
2. Biology of Protozoa - Sleials.
3. Protozoology - Kudo.
4. An introduction to parasitology -Chandler
5. General Parasitology - Cheng.
6. Biology of Parasites - Cheng.
7. Nematode Parasites - N.D. Levine
8. Structure of Nematode - A.F. Bird
9. An introduction to nematology - Chitwood
10. System Helmintum - S.Yamaguti (Vol.II & III)
11. Biology of Animal Parasite - Saunders
12. Clinical Parasitology - Faust
13. Medical Helminthology - Watson.
14. Parasitology - K.D. Chatterji
15. Indian insect life - Lefrey.
16. A Hand Book of Entamology - T.V.R. Ayyar.
17. Useful & Destructive insects - Metcalf & flint
18. Applied parasitology - Hiware, Jadhav & Mohekar
19. Nematodes of Indian Mammals - H.S. Nama, G.B. Shinde & B.V. Jadhav

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
NANDED  
FACULTY OF SCIENCE  
B.Sc. T.Y.  
THEORY PAPER- IX (C)  
ENTOMOLOGY  
(New Syllabus w.e.f. 2010-2011)**

**Unit I**

1. General Character of class insect. 03
2. Methods of collections, preservation and study of insects. 04
3. Type Study- **Cockroach**, classification, External characters, 12  
Digestive system, Respiratory system, Excretory System, Nervous  
System, Reproductive System.
4. Insect mouth parts: Biting and Chewing, piercing and Sucking, sponging  
and siphoning type. 06

**Unit II**

1. Study of Insect orders: 12  
Salient features with suitable examples of following orders:  
Orthoptera, Odonata, Isoptera Hymenoptera, Lepidoptera Coleoptera.
2. Types of Metamorphosis in insect. 03
3. Hormonal and pheromonal control of insect. 02

**Unit- III**

1. Beneficial insects : (Classification, External Morphology, Life  
Cycle and Economic Importance) 09
  1. Silkworm and sericulture.
  2. Honey and apiculture
  3. Lacinsect and lac-culture.
2. Household and human insect pest : Structure, Binomics and control  
measures of Housefly, Mosquito, Ratflea, Bed bug, head louse. 10
3. Study of non-insect animal pests and their control. 06  
Ex. Rat, Pig, Monkey, Birds, Ticks and Mites.

#### Unit IV)

1. Agriculture pests from this area : classification Bionomics, Control measures of the following. 12
  - a. Cotton-Boll worm, red cottonbug.
  - b. Jawar-stem borer, Midge fly.
  - c. Sugarcane- Pyrilla
  - d. Oil seeds – ground nut White grub ,Safflower-aphid
  - e. Fruits- Lemon butter fly
  - f. Mango- Stem borer, stone weevil.
  - g. Stored grain pest- Rice weevil
  - 2 Insect control methods.
    - h. Chemical control and safe handling of pesticides.
    - i. Biological control.
    - j. Physical and Mechanical control.
    - k. Hormone and phermon as a control agents.
    1. Integrated pest control of insects.
2. Insect ecology: Effect of temperature, humidity and food on insect life.02

RECOMMENDED BOOKS FOR ENTOMOLOGY-

1. K. K. Nayar, Tnant Kirshnanand B.W. David- General and applied Entomology.
2. C.L. Metcalf and W.P. fling- Destructive and useful inset.
3. Hemsing pruthi : A text book of Agricultural Entomology
4. Wigglesworth : Principles of insect physiology.
5. ESSIG : College entomology.
6. M.S. Mani : A text book of General Entomology.
7. Government of Maharashtra. : Crop pests and how to fight them.
8. Oldoyd, N. : A collection, preserving and studying insects.
9. Roger P. and Anderson: Forest and shade tree entomology.
- 10.D.B. Temphare : Modern Entomology
- 11.R.E. Fradt : Fundamentals of Applied entomology.
- 12.K.C.V. Smith : Insects and other arthropods of Medical
- 13.D.N. Ray and A.W.A Brown : Entomology medical and veterinary
- 14.Chandler A.C. and Read C.P. introduction of Parasitology.
- 15.P. Debatch : Biological control of natural enemies.
- 16.Apple J.L. and Smith R.F. : Integrated pest management.
- 17.Cheny : General Parasitology.
- 18.Corbet J.R. : The biochemical mode of action of pesticides.
- 19.Champman R.F. : Insects – Structure and function.
- 20.O.W. Richards and R.G. Davies : Imms text book of Entomology
- 21.Bursell E. : An introduction to insect physiology.
- 22.Rockstein M Vol. (I-VI) : The physiology of insects.
- 23.Shrivastave K.P. Vol (I-III) : A text book of applied Entomology
- 24.Hohanson O.A. : Ebryology of insects and Myriopods.
- 25.Ross H.A. : A text book of Entomology.
- 26.Srivastava K.P. : A Text of applied Entomology – II

**B.Sc. Third Year Zoology**  
**Paper- IX (D)**  
**Environmental Biology and Environmental Pollution**  
**Periods: 80** **Marks -100**

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**Unit – 1**

**1. Introduction in Biology:**

- a. Atmosphere: Structure and composition.
- b. Hydrosphere: Physico -chemical properties of water.
- c. Lithosphere: Soil profile and process of soil formation.

**2. Biogeochemical cycles:**

- a. Hydrological cycle,
- b. Nitrogen cycle,
- c. Carbon cycle,
- d. Sulphat cycle.

**3. Ecosystem :**

- a. Concept, structure and components.
- b. Ecological pyramids.
- c. Food chains and Food web

**Unit- II**

**4. Marine Ecosystem:**

- a. Zonation in Marine habitat.
- b. Abyssal habitat and deep sea fauna

**5. Biodiversity**

- a. Importance of preserving Biodiversity
- b. Biodiversity conservation .
  - a) Exsitu conservation.
  - b) In-situ conservation.

**6. Wild life and its conservation:**

- a. Sanctuaries and zoological parks.

### **Unit-III**

2. Introduction to Environmental pollution , Biodegrade and non-degradable pollutions,
3. Water pollution: Sources and effect of major water pollutants.
4. Pollution by sewage and domestic wastes eutrophication, Algal Blooms, sewage Treatment plants.
5. Pollution by heavy metals: Sources and effects of Lead and Mercury as pollutants.
6. Air Pollution : Sources and effect of major air pollutants:
  - a. Thermal power plants, Industrial chimney wastes, Automobile exhausts.
  - b. Sulphate compounds as air pollutants- sources and effect.
  - c. Oxides of Nitrogen as air pollutants -sources and effect.
  - d. CO<sub>2</sub> and CO as pollutants- sources and effect.
  - e. Acid rains.
  - f. Ozone as protector and estroyer.
  - g. Chlorofuoro carbons
  - h. Photochemical smog.
  - i. Gravity Settlers.
  - j. Gaseous control – packed towers, separate towers.

### **Unit-IV**

7. Radio active pollution : Sources and effect.
8. Pollution by solid wastes.
9. Noise pollution : Sources and effects.
10. Pollution control legislation : Environmental (Protection) act.
11. Environmental pollution Monitoring and Environmental impact Assessment.
12. Environmental Education in India: Present scenario.

13. Water Resources Water resources : Infiltration galleries, infiltration wells

Water treatment Methods – Sedimentation tank.

Aerobic treatment – Trickling filters.

Anaerobic treatment – Imhoff tank

## List of Books

- 1 P.S. Verma and V.K. Agrawal : Environmental Biology
- 2 P.D. Sharma : Environmental Biology
- 3 P. D. Sharma : Toxicology
- 4 E. P. Odum : Fundamentals of Ecology
- 5 Ranganalla : Water and Waste water Engg.
- 6 P. D. Sharma : Microbiology
- 7 Kndosia : Water Pollution
- 8 M. V. Rao : Air Pollution
- 9 National Env. Engineering : Manual on water waste analysis  
Research, (NEERI) Nehru  
Marg. 440020
- 10 M.M. Saxena : Environmental analysis water soul  
and a
- 11 Trivedu & Goel P.K. : Chemical and Biological methods for  
water pollution studies (Published by  
Environmental publisher KARAD)
- 12 Trivedi P.R. & Raj Gurudeep : Environmental water & soil analysis
- 13 Trivedi P.R. & Raj Gurudeep : Environmental Air analysis  
(published by Akashdeep Pub.  
House,New Delhi.)

**B.Sc. III Zoology**  
**Pattern of Question Paper**  
**Paper VIII & IX**

Time :- 3.00 Hrs.

Max. Marks :- 100

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- Q1. Multiple Choice Questions (10)  
(Minimum two from each unit)
- Q2. Long Answer question from unit – I (20)  
Or  
Write notes on  
a) Based on Unit – I  
b) Based on Unit – I
- Q3. Long Answer question from unit – II (20)  
Or  
Write notes on  
c) Based on Unit – II  
d) Based on Unit – II
- Q4. Long Answer question from unit – III (20)  
Or  
Write notes on  
a) Based on Unit – III  
e) Based on Unit – III
- Q5. Long Answer question from unit – IV (20)  
Or  
Write notes on  
b) Based on Unit – IV  
f) Based on Unit – IV
- Q 6. Write Short Notes on any two of the following (10)  
a) Based on Unit – I  
b) Based on Unit – II  
c) Based on Unit – III  
d) Based on Unit – IV

# Laboratory practicals for B.Sc. III<sup>rd</sup> Year (Zoology)

## Ecology Ethology ,Biometry and Bioinformatics

### Paper No. X

- 1) Estimation of Dissolved O<sub>2</sub> from Water Sample.
- 2) Estimation of Dissolved CO<sub>2</sub> from Water Sample.
- 3) Estimation of Chlorides & Salinity from Water Sample.
- 4) Estimation of Population Density from Water Sample / Terrestrial area.
- 5) Museum study of Vertebrate Endangered Species on the Basis of Charts/Models / Photographs (Any Five)
- 6) Determination and study of Atmospheric Humidity.
- 7) Problems based on Mean, Mode, Median.
- 8) Classification of Data
  - i) Histogram.
  - ii) Bar-diagrams.
  - iii) Polygon Frequency Curve.
- 9) Problems based on Analysis of Frequencies. (Continuous and Discrete Frequency)
- 10) Study of Positive and Negative Phototropism with suitable Animals.
- 11) Study of social Behaviors of Insects. (Honey bees , Termites)
- 12) Study and Observation of Nest Construction of various Birds.
- 13) Study and Observation of Protective Coloration in Animals.
- 14) Study and Observation of Mimicry.
- 15) Study of Computer Application in Biology.
- 16) Computer Application in Statistical problems.
- 17) Computer Application in Graphic Representation / Data Representation.

**PRACTICAL**  
**B.Sc. III ZOOLOGY**  
**Aquaculture & Polyculture**  
**Paper XI (A)**

Marks 100

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1. Identification of Fresh Water Fishes and Indigenous and exotic carps ( any Ten )
2. Identification of Marine Water Fishes (Any Five)
3. Identification of Cultivable Species of Prawn, Lobster and molluses
4. Identification of Phytoplankton ( any five)
5. Identification of Zooplanktons (any five)
6. Study of Water Weeds – Chara, Utricularia , Pristia, Hydrilla, Spirogyra, Typha.
7. Estimation of Dissolved Oxygen in water sample.
8. Estimation of Carbon dioxide in Water Sample
9. Estimation of Chloride in water sample
10. Examination of Stomach contents of two types (Carnivorous and Herbivorous ) Fishes to study feeding habits.
11. Identification of Fishing Crafts and Gears (Model)
12. Study of Fish Parasites
13. Dissection of Brain, Pituitary Gland, Cranial nerves and weberian ossicle from Labeo
14. Visit to Fish Breeding Farm

**Pattern of Skeleton Question Paper**  
**Practical – Paper XI (A)**  
**Aquaculture and Pisciculture**

Time :- 4.00 Hrs.

Max. Marks :- 100

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Q1. Dissect out / Expose Brain, Pituitary Gland, Weberian Ossicle, and cranial Nerves ( any one) (15)

Or

Examine Stomach Contents of Given Fish and comment on its Feeding habits

Q2. Estimate Dissolved Oxygen/Carbon dioxide /Chlorides from the given Water Sample. (15)

Q. 3. Identify and describe phyto and Zooplankton (any three) (15)

Or

Identify and describe Aquatic Weeds (any three)

Q 4. Identify and Describe Fresh Water / Marine Water Fishes ( Three Fresh Water and Two from Marine Water) (20)

Q5. Identify and Describe Cultivable Species of Prawn, Lobster, Molluscs and Food Fish. (20)

Q.6 Record Book (10)

Q7. Viva – Voce (05)

**SWAMI RAMANANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**Syllabus (Practical)**

B. Sc. Third year Zoology (Annual pattern)  
Applied Parasitology – Paper – XI (B)

Marks – 100

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**Section – A.**

1. Identification, Classification and description of permanent slides of –

- i. *Trypanosoma sp.*
- ii. *Balantidium colli*
- iii. *Entamoeba sp.*
- iv. *Eimeria sp.*
- v. *Trichomonas sp.*
- vi. *Plasmodium sp.*

2. Collection staining, identification and description of –

- i. Trypanosoma from rat blood With Gimsa's stain)
2. Flagellates from the rectum of frog or caloetes (with Gimsa's stain)
3. Balantidium nycotoheres and Opallina from rectum of frog.

**Section – B.**

1. Identification, Classification and description of permanent slides of –

- i. *Schistosoma haematobium*,
- ii. *Fasciola hepatica*,
- iii. *Taenia saginata*,
- iv. *Echinococcus granulosus*,
- v. *Enterobius vermicularis*,
- vi. *Ancylostoma deodenales*,
- vii. *Ascaris lumbricoides*,
- viii. *Wuchereria bancrofti*,
- ix *Dracunculus medenensis*

2. Collection, preservation, staining, identification, classification and description of Helminths from –

- i. Fish.
- ii. Rat,
- iii. Fowl.

**Section – C.**

1. Collection, preservation, identification, classification and description of –

- i. Bedbug,
- ii. House fly,
- iii. Mosquito.
- iv. Pediculus
- v. Cockroach

2. Preparation of permanent slides of mouth-parts of –

- i. House fly,                      ii. Mosquito,
- iii. Honey bee,                  iv. Cockroach,
- v. Bedbug.

Note – a). Submission of 10 permanent slides (Minimum 3 from each section as above) Is compulsory during practical examination.

b). Excursion tour and submission of the report.

**SWAMI RAMANANAND TEERTH MARATHWADA UNIVERSITY, NANDED**

Question Paper Pattern of the Practical Examination

**B. Sc. Third year Zoology (Annual pattern)**

**Applied Parasitology – Paper – XI (B)**

Date -

Batch No-

Marks – 100

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Q. 1. Prepare a permanent slide of the flagellate parasite from the blood of rat/  
rectal content of frog/ calcoetes and identify giving reasons. 20 Marks

OR

Prepare a permanent slide of ciliate parasite from the rectal content of frog and identify giving reasons.

Q. 2. Prepare a permanent slide of trematode/ cestode/nematode from the  
vertebrate host 20  
Marks.

Q.3. Prepare a permanent slide of mouthparts from the given specimen and identify giving  
reasons. 12  
Marks.

Q. 4. Identify, classify and describe the following six parasites - 18 Marks

Protozoans-	1.	2.
Helminths-	3.	4.
Arthropods -	5.	6.

Q. 5. Record book 10  
Marks

Q.6. Viva-voce. 10  
Marks

Q. 7 Submission of 10 Permanent Slides and excursion report. 10  
Marks.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
NANDED  
FACULTY OF SCIENCE  
PRACTICAL PAPER- XI(C)  
ENTOMOLOGY  
(New Syllabus w.e.f. 2010-2011)**

1. External morphology of Cockroach.
2. Dissection : Digestive System, Nervous System and Reproductive System.
3. Mounting of mouthparts of insect: Biting and Chewing, piercing and sucking, siphoning and spooning.
4. Methods of collection and preservation of insects.
5. Whole mounting of various insects and its identification (Minimum-10)
6. Museum Study: (Atleast 10 specimens preferably from different insect orders to be selected)
  - a. Orthoptera.
  - b. Odonata.
  - c. Isoptera
  - d. Hemiptera
  - e. Hymemptera.
  - f. Lepidoptra.
  - g. Coleoptera.
7. Study of House hold and Human insect pests: Rat flea, Bed bug, Housefly, Head louse.
8. Study of various stages of metamorphosis of following insects.  
Silk moth, Honeybee, Cockroach, Grasshopper,.
9. Study of non insect animal pest :
  - a. Rat
  - b. Bird
  - c. Monkey
  - d. Pig
  - e. Deer
10. Collection & Identification of agriculture insect pests from local area.  
(Minimum 10).

Study tour: At least two visits to the crop field.

**Practical Syllabus for  
Environmental Biology And Environmental Pollution  
Paper XI (D)**

**Marks -100**

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1. Measurement of Relative humidity.
2. Estimation of dissolved oxygen in water sample
3. Estimation of CO<sub>2</sub> in water sample.
4. Estimation of organic matter in soil sample.
5. Determination of Turbidity of water.
6. Estimation of dissolved solids in water.
7. Estimation of suspended solids in water.
8. Study of phytoplankton and Zooplankton in freshwater.
9. Effect of heavy metals on O<sub>2</sub> Consumption of crab/fish/any suitable animal.
10. Effect of pesticide on O<sub>2</sub> consumption of crab/fish/any suitable animal.
11. Studying effect of gaseous pollutant (SO<sub>2</sub>) on plant.
12. Studying effect of gaseous pollutant (H<sub>2</sub>S) on plant.
13. Effect of pollutant/ pesticide on heart beats of frog/damping/any suitable animal.
14. Effect of pollutants as animal activity like respiratory activity of fish.
15. Study of fresh water ecosystem -visit to pond/river for on the spot study.
16. Study of animals reorientation from different zones of sea (Any 5 animals reorientation be studies)