

# **Bhakta Kavi Narsinh Mehta University**

## **Junagadh**



FACULTY OF SCIENCE

[Three Years (6 Semesters) Full Time Course]

## **ZOOLOGY SYLLABUS**

**2017 - 18**

**Semester III & IV**  
**(S.Y. B.Sc.)**

**SEMESTER III – PAPER – Z-03**

**&**

**SEMESTER IV – PAPER – Z-04**

## EXAMINATION CODING SYSTEM

| Sr. No. | Name Of Programme           | B.Sc. ZOOLOGY                                                                                                                                                                      |                                                                                                                                                                                                                 |
|---------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Title Of Paper              | (In Sem -III)<br>Non Chordate :<br>Systematic, Forms & Functions, Cell Biology & Histology, Animal Behaviour & Economic Zoology, Wild life Biology, Ecology & Instrumental Biology | ( In Sem -IV)<br>Chordate: Systematic, Forms & Functions, Embryology, Physiology & Reproductive Biology, Genetics & Inborn Errors of Metabolism, Evolution, Functional Anatomy of chordates & Fisheries Biology |
| 2       | Theory Credit               | 4                                                                                                                                                                                  | 4                                                                                                                                                                                                               |
| 3       | Practical Credit            | 3                                                                                                                                                                                  | 3                                                                                                                                                                                                               |
| 4       | Total Credit                | 7                                                                                                                                                                                  | 7                                                                                                                                                                                                               |
| 5       | External Marks Of Theory    | 70                                                                                                                                                                                 | 70                                                                                                                                                                                                              |
| 6       | Internal Marks Of Theory    | 30                                                                                                                                                                                 | 30                                                                                                                                                                                                              |
| 7       | Total Marks Of Theory       | 100                                                                                                                                                                                | 100                                                                                                                                                                                                             |
| 8       | External Marks Of Practical | 35                                                                                                                                                                                 | 35                                                                                                                                                                                                              |
| 9       | Internal Marks Of Practical | 15                                                                                                                                                                                 | 15                                                                                                                                                                                                              |
| 10      | Total Marks Of Practical    | 50                                                                                                                                                                                 | 50                                                                                                                                                                                                              |
| 11      | Grand Total                 | 150                                                                                                                                                                                | 150                                                                                                                                                                                                             |
| 12      | External Exam Time Duration | 2½ Hours                                                                                                                                                                           | 2½ Hours                                                                                                                                                                                                        |

| Course / Paper Code |          |   |   |   |   |
|---------------------|----------|---|---|---|---|
| 13                  | Year     | 1 | 7 | 1 | 7 |
| 14                  | Faculty  | 0 | 3 | 0 | 3 |
| 15                  | Subject  | 0 | 4 | 0 | 4 |
| 16                  | UG/PG    | 0 | 1 | 0 | 1 |
| 17                  | Semester | 0 | 3 | 0 | 4 |
| 18                  | Paper    | 0 | 3 | 0 | 4 |
| 19                  | Core     | 0 | 0 | 0 | 0 |

# **Bhakta Kavi Narsinh Mehta University**

## **Junagadh**



### **ZOOLOGY** **SYLLABUS**

**WITH EXAMINATION CODING SYSTEM**

**[SYLLABUS FOR THE CHOICE BASED CREDIT SYSTEM (CBCS)]**

**Revised Syllabus**  
**INFORCE FROM JUNE – 2017**

**[SYLLABUS FOR CHOICE BASED CREDIT SYSTEM (CBCS)]**

**INFORCE FORM JUNE – 2017**

**SUBJECT: ZOOLOGY**

**WITH EXAMINATION CODING SYSTEM**

**SEMESTER – III**

**ZOOLOGY PAPER – Z \*– 03**

**Non Chordate : Systematic, Forms & Functions, Cell Biology & Histology,  
Animal Behaviour & Economic Zoology, Wild life Biology, Ecology &  
Instrumental Biology**

**SEMESTER – IV**

**ZOOLOGY PAPER – Z – 04**

**Chordate: Systematic, Forms & Functions, Embryology, Physiology &  
Reproductive Biology, Genetics & Inborn Errors of Metabolism, Evolution,  
Functional Anatomy of chordates & Fisheries Biology**

## FORWARD

Renewing and updating of the Curriculum is the prime important criteria in the University education system.

Syllabus provides an educational guide line and demarks the horizon of a subject. Syllabus of different Theory and Practical papers should have subjective harmony and gradual relationship within periphery of a subject.

Formulation of Curriculum for a particular subject requires the following criteria.

- (A) Background of previous Curriculum.
- (B) Relationship with other related subjects.
- (C) Resources of Educational needs at regional level as well as national level.
- (D) Financial and Statuary provisions of the State government.

All the above criteria are taken into consideration in formulation of this Curriculum.

This Curriculum is the result of prolonged discussions among the experienced teacher in this subject because after all, the college teachers are the real catalysts for implementation of this Syllabus.

The proposed Syllabus after required formalities will be implemented in the second year B.Sc.

Valuable guidelines and all facilities in this curriculum are provided by the authorities of the Saurashtra University, Rajkot.

# Bhakta Kavi Narsinh Mehta University, Junagadh

(CBCS Syllabus)

## SEMESTER – III

### PAPER – Z-03

Non Chordates : Systematics, Forms & Functions, Cell biology & Histology,  
Animal behaviour & Economic Zoology, Wild life Biology, Ecology &  
Instrumental Biology

#### **UNIT – 1: SYSTEMATIC**

Salient feature & classification up to classes in Non-chordates, structural organization in different phylum of Non-chordates with examples. Phylum-Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata.

#### **UNIT – 2: FORMS AND FUNCTIONS IN ANIMALS**

##### **2.1 PORIFERA:**

- (i) General account of Canal System in Sponge
- (ii) Economic Importance of Sponge.

**2.2** General structures and morphology with functional anatomy of following type

**ANNELIDA: Type Study: Leech**

##### **2.3 ARTHROPODA:**

- (i) Peripatus is as connecting link between Annelida & Arthropoda.
- (ii) Different type of Mouth parts in Insects.
  - 1. Chewing & Biting Type – Cockroach
  - 2. Chewing & Lapping Type – Honey Bee

3. Piercing & Sucking Type – Mosquito
4. Sponging Type – Housefly
5. Siphoning Type – Butterfly

### **UNIT – 3: CELL BIOLOGY AND HISTOLOGY**

#### **3.1 CELL BIOLOGY: Only Structure and Function of following organelles.**

- (i) Golgi Complex
- (ii) Ribosome
- (iii) Lysosome
- (iv) Centrioles & Basal Bodies

#### **3.2 HISTOLOGY: Histological structure and function of following organs of Mammals.**

- (i) Pituitary
- (ii) Thyroid
- (iii) Adrenal
- (iv) Kidney

### **UNIT – 4: ANIMAL BEHAVIOUR & ECONOMIC ZOOLOGY**

#### **4.1 Social Behaviour:**

- (i) Honey bee
- (ii) Termite

#### **4.2 Courtship & Reproductive Behaviour:**

- (i) Spider
- (ii) Scorpion
- (iii) Peacock

#### **4.3 Parental Care Behaviour:**

- (i) Arius
- (ii) Ichthyophis
- (ii) Alytes

#### **4.4 Household Insects:**

- (i) Insect affecting Human health: 1. Tse-Tse Fly, 2. House Fly, 3. Mosquito
- (ii) Insect damaging Food Products: 1. Rice Weevil, 2. Wheat Weevil
- (iii) Insect damaging Household Goods: 1. Termite, 2. Silver Fish, 3. Cricket
- (iv) Insects damaging Storage grains: 1. Tribolium, 2. Pulse beetle

(v) Pest of Crop: 1. Brinjal Fruit & Shoot Borer, 2. Cabbage Butterfly, 3. Rice bug

#### **4.5 Insect Pest Management:**

- (i) Cultural Control
- (ii) Biological Control
- (iii) Chemical Control

### **UNIT – 5: WILD LIFE BIOLOGY, ECOLOGY & INSTRUMENTAL BIOLOGY**

#### **5.1 Wildlife in India & its Conservation**

#### **5.2 Reasons for depletion OF Wild-life**

#### **5.3 Wild-life in Gujarat:**

- (I) NATIONAL PARKS:                      (i) Vansda National Park  
                                                            (ii) Velavadar National Park
- (II) SANCTUARIES:                        (i) Ratanmahal Sloth bear Sanctuary  
                                                            (ii) Shoolpaneshwar Wild life Sanctuary

#### **5.4 Threatened Wild animals of India:**

- (i) Mammals: Slender Loris, Black Nilgiri Langur, Cheetah, Asiatic Lion, Tiger, Snow leopard
- (ii) Birds: Pink Headed Duck, Himalayan Golden Eagle, Peacock, Great Indian Bustard, Greater Flamingo, Vulture

#### **5.5 Ecology:**

- (i) Energy Flow in Eco-system
- (ii) Ecological pyramids

#### **5.6 Instrumental Biology:**

- (i) Phase Contrast Microscope
- (ii) Haemoglobinometer
- (iii) Sphygmomanometer



## PRACTICALS RELATED TO PAPER – Z-03

### **Practical: 1 : Identification and classification of Invertebrate animals**

- (i) Phylum: Protozoa : Noctiluca, Amoeba, Plasmodium, Opalina, Paramecium
- (ii) Phylum: Porifera : Grantia, Hyalonema, Chalina

### **Practical: 2 : Identification and Classification of Invertebrate animals.**

- (i) Phylum: Coelenterata : Obelia, Aurelia, Gorgonia
- (ii) Phylum: Platyhelminthes : Bipalium, Schistosoma, Moniezia Expansa
- (iii) Phylum; Aschelminthes : Enterobius vermicularis, Filarial worm, Guinea worm

### **Practical: 3 : Identification and Classification of Invertebrate animals**

- (i) Phylum: Annelida : Nereis, Lumbricus, Pontobdella,
- (ii) Phylum : Arthropoda :- Peripatus, Prawn, Centipede, Grasshopper, Spider, Limulus

### **Practical: 4 : Identification and Classification of Invertebrate animals**

- (i) Phylum: Mollusca : - Chaetoderma, Mytilus, Aplysia, Dentelium, Loligo
- (ii) Phylum: Echinodermata: Anthena (Star fish), Ophiocoma (Brittle Star), Echinocardium (Heart urchin), Holothuria (Sea Cucumber), Antedon (Feather Star)
- (iii) Phylum : Hemichordata : Saccoglossus, Rhabdopleura

### **Practical: 5 : To Study Systems of Leech:**

- (i) External Characters
- (ii) Digestive System
- (iii) Nervous System
- (iv) Reproductive System
  - By chart or Multimedia

### **Practical: 6 : To Study Mounting of Leech:**

- (i) Jaws
- (ii) Salivary Gland
- (iii) Nephridia
- (iv) Ovary
  - By chart or Multimedia or Slide

### **Practical: 7 : To Study Mouthparts of Insects:**

- (i) Chewing & Biting Type – Cockroach

- (ii) Chewing & Lapping Type – Honey Bee
- (iii) Piercing & Sucking Type – Mosquito
- (iv) Sponging Type – Housefly
- (v) Siphoning Type – Butterfly

**Practical: 8 : To Study Cell Organelles:**

- (i) Golgi Complex
- (ii) Ribosome
- (iii) Lysosome
- (iv) Centrioles & Basal Bodies

**Practical: 9 : To Study Histological Structure of Mammalian Organs:**

- (i) Pituitary
- (ii) Thyroid
- (iii) Adrenal
- (iv) Kidney

**Practical: 10 : To Study Animal Behaviours:**

**1. Social Behaviour:**

- (i) Honey bee
- (ii) Termite

**2. Courtship & Reproductive Behaviour:**

- (i) Spider
- (ii) Scorpion
- (iii) Peacock

**3. Parental Care Behaviour:**

- (i) Arius
- (ii) Ichthyophis
- (ii) Alytes

**Practical: 11 : To Study Household Insect:**

- (i) Insect affecting Human health: 1. Tse-Tse Fly, 2. House Fly, 3. Mosquito
- (ii) Insect damaging Food Products: 1. Rice Weevil, 2. Wheat Weevil
- (iii) Insect damaging Household Goods: 1. Termite, 2. Silver Fish, 3. Cricket
- (iv) Insects damaging Storage grains: 1. Tribolium, 2. Pulse beetle
- (v) Pest of Crop: 1. Brinjal Fruit & Shoot Borer, 2. Cabbage Butterfly, 3. Rice bug

**Practical: 12 : To Study apparatus for collecting and killing method:**

- (i) Insect Net
- (ii) Aspirator
- (iii) Killing Jar

**Practical: 13 :** To Study National Parks and Sanctuaries of India:

- (i) Vansda National Park
- (ii) Velavadar National Park
- (iii) Ratanmahal Sloth bear Sanctuary
- (iv) Shoolpaneshwar Wild life Sanctuary

**Practical: 14 :** To Study Threatened Wild animals of India:

- (i) Mammals: Slender Loris, Black Nilgiri Langur, Cheetah, Asiatic Lion, Tiger, Snow leopard
- (ii) Birds: Pink Headed Duck, Himalayan Golden Eagle, Peacock, Great Indian Bustard, Greater Flamingo, Vulture
  - by photograph, Chart, stuffed animals or multimedia.

**Practical: 15 :** To Study Principle, Structure & Function of Following

Instruments:

- (i) Phase Contrast Microscope
- (ii) Haemoglobinometer
- (iii) Sphygmomanometer

**Practical: 16 :** Visit to any one National Park or Sanctuary OR Reserve forest area.

## DISTRIBUTION OF UNITS

### SEMESTER – III

| <b><u>PAPER – Z-03</u></b> |                                                              |                      |               |
|----------------------------|--------------------------------------------------------------|----------------------|---------------|
| <b>Unit No.</b>            | <b>Unit Title</b>                                            | <b>Theory Period</b> | <b>Marks.</b> |
| <b>Unit : 1</b>            | <b>Systematic</b>                                            | 10                   | 14            |
| <b>Unit : 2</b>            | <b>Forms and Functions</b>                                   | 18                   | 14            |
| <b>Unit : 3</b>            | <b>Cell Biology and Histology</b>                            | 10                   | 14            |
| <b>Unit : 4</b>            | <b>Animal behaviour &amp; Economic Zoology</b>               | 15                   | 14            |
| <b>Unit : 5</b>            | <b>Wild life Biology, Ecology &amp; Instrumental Biology</b> | 12                   | 14            |
| <b>TOTAL :</b>             |                                                              | <b>65</b>            | <b>70</b>     |

- Above statement concerned to only Theory portion of the paper.
- Above mentioned third column ‘Theory Period’ indicates total number of theory lectures per unit.
- Total syllabus should be completed within 65 theory lectures.
- Each and every units are carries equal 14 marks.
- Total marks for theory examination are 70 marks.
- **PAPER SETTER MUST FOLLOW THE UNIT WISE MARK SETUP.**

**Bhakta Kavi Narsinh Mehta University**

**THEORY EXAMINATION**

**SEMESTER – III**

**ZOOLOGY**

(Based on Paper – Z-03)

Time: 2½ Hours

Total Marks: 70

**Instructions:**

1. Illustrate your answer with neat and labeled diagram.
2. Figure to the right side indicates full marks of questions.

**QUESTION-1 (THIS QUESTION IS TAKEN FROM UNIT-1)**

**QUESTION-2 (THIS QUESTION IS TAKEN FROM UNIT-2)**

**QUESTION-3 (THIS QUESTION IS TAKEN FROM UNIT-3)**

**QUESTION-4 (THIS QUESTION IS TAKEN FROM UNIT-4)**

**QUESTION-5 (THIS QUESTION IS TAKEN FROM UNIT-5)**

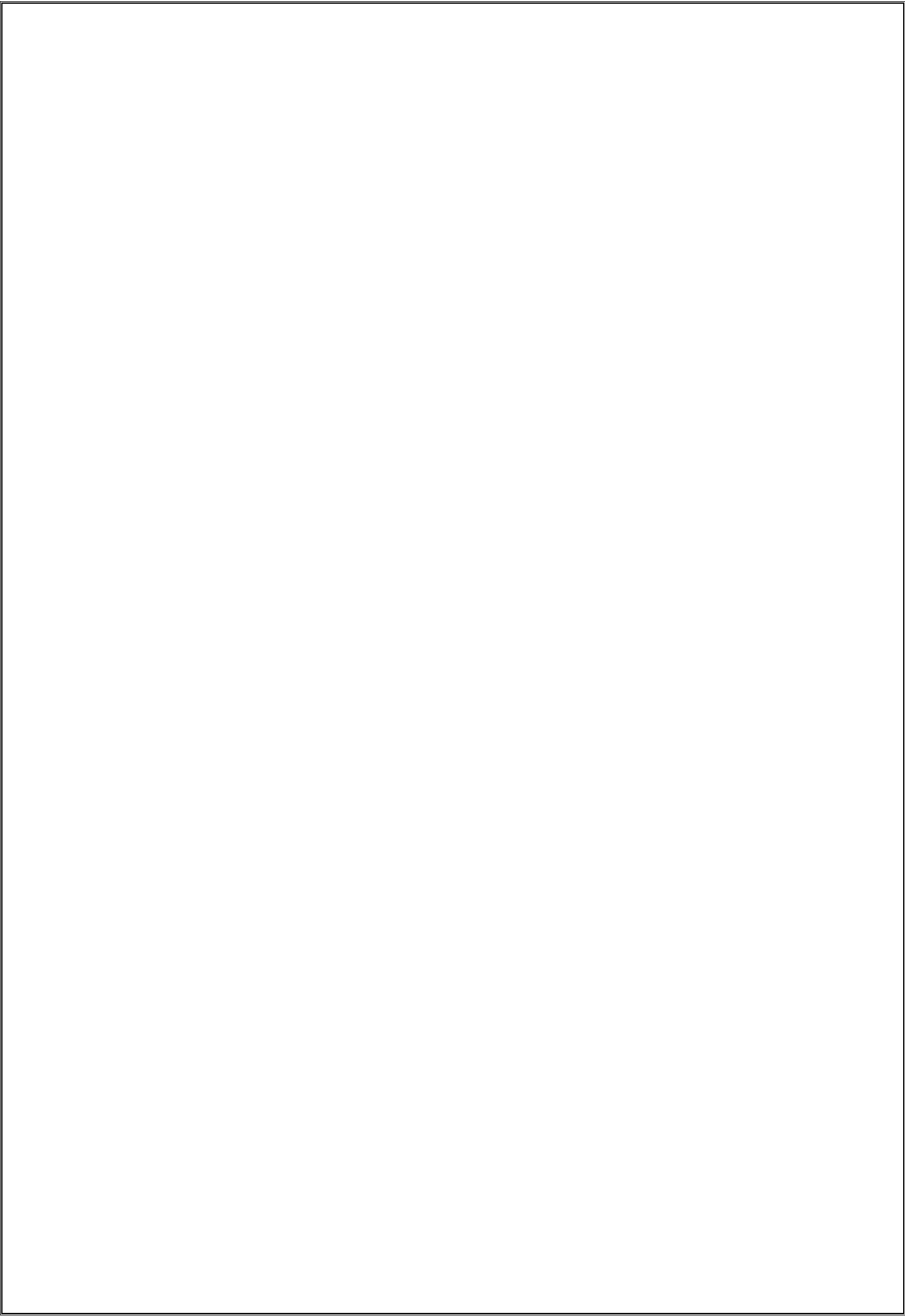
**- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.**

**- EACH QUESTION CARRIES EQUAL MARKS – 14.**

**- THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS**

**Each question divide in a, b and c sub question as shown below.**

- (a) Answer the following (any one out of two) [07 Marks]  
(Theory question)
- (b) Attempt any one (out of two) [04 Marks]  
(Application / Example / Problem / Theory)
- (c) Attempt any three (out of five) [03 Marks]  
(Short answer / one word / one line / true or false / fill up the blanks)



# **PRACTICAL EXAMINATION**

## **SEMESTER – III**

### **ZOOLOGY**

(Based on Paper – Z-03)

**Time: 3 Hours**

**Total Marks: 35**

- Que -1: Sketch and label \_\_\_\_\_ system of Leech. [06]
- Que – 2: Sketch and label /Mountings of Leech\_\_\_\_\_.  
(Practical-6) [03]
- Que – 3: Do as per instruction and show it to examiner [03]  
(Practical – 8)
- Que – 4: Do as per instruction and show it to examiner [03]  
(Practical – 15)
- Que – 5: Write as per instruction. [14]
- (A) Identify and classify giving reasons.  
(Lower invertebrate, Practical- 1&2)
  - (B) Identify and classify giving reasons.  
(Higher invertebrate, Practical – 3&4)
  - (C) Identify and describe. (Practical- 7)
  - (D) Identify and describe. (Practical-9)
  - (E) Identify and describe (Practical-10)
  - (F) Identify and describe (Practical-11/12)
  - (G) Identify and describe (Practical-13/14)
- Que. – 5: Report and Viva-voice. [03]
- Que – 6: Certified Journal. [03]



**Bhakta Kavi Narsinh Mehta University**  
**List of Slides, Specimens, Charts, Models & Photographs**

**SEMESTER – III**

**ZOOLOGY**

(Based on Paper – Z-03)

**LIST OF SLIDES:**

- (1) All animals from Protozoa. [Practical-1, ( i)]
- (2) Obelia, Schistosoma, Enterobius vermicularis, Filaria worm [Practical-2, (i), (ii), (iii)]
- (3) Mountings of Leech [Practical-6]
- (4) Mouth Parts of Insects. [Practical-7]
- (5) Histological Structure of mammalian organs. [Practical-9]
- (6) Termite [Practical-10, (i)]
- (7) Tse-Tse Fly, Mosquitoe, Rice Weevil, Wheat Weevil, Tribolium, Pulse beetle, Rice bug [ Practical-11, (i), (ii), (iv), (v)]

**LIST OF SPECIMENS:**

- (1) All animal specimens from Phylum- Porifera to Phylum-Hemichordata. [Practical-1 to Practical-4, except Practical-1, (i) & Obelia, Schistosoma, Enterobius vermicularis, Filaria worm ]
- (2)Animal Behaviour & Household Insects [Practical-10 & 11 except Termite, Tse-Tse Fly, Mosquito, Rice Weevil, Wheat Weevil Tribolium, Pulse beetle Rice bug]

**LIST OF CHARTS/MODELS/PHOTOGRAPHS:**

- (1) Systems of Leech. [Practical-5]
- (2) Cell Organelles. [Practical-8]
- (3) Apparatus for collecting and killing method [Practical-12]

(4) National Parks & Sanctuaries of Gujarat State &Threatened Mammals and Birds. [Practical-13 & 14]

### **LIST OF INSTRUMENTS:**

[Practical-15]

(i) Phase Contrast Microscope

(ii) Haemoglobino Meter

(iii) Sphygmomanometer

## REFERENCE BOOKS

### SEMESTER – III

#### List of books For Unit-1 & 2

- 1 : Invertebrate Zoology.....E.L.Jordan & Dr.P.S.Verma
- 2 : Invertebrate Zoology.....P.S.Dhami &J.K.Dhami.
- 3 : A modern textbook of Zoology Invertebrate Zoology.....R.L.Kotpal.
- 4 : A textbook of Practical Zoology-Invertebrates.....S.S.Lal
- 5 : Kotpal Series – Porifera.....R.L.Kotpal
- 6 : Kotpal Series – Annelida.....R.L.Kotpal
- 7 : Kotpal Series – Arthropoda.....R.L.Kotpal
- 8 : A Manual of Practical Zoology, Invertebrates.....P.S.Verma

#### List of books For Unit-3

- 9 : Cell Biology.....Dr. Satyeshchandra Roy.
- 10 : Cell Biology.....C.B.Power
- 11 : Cytology & Genetics.....P.K.Gupta
- 12 : Cell & Molecular Biology.....De Robertis.
- 13 : Biotechnological Cell Biology.....V.B.Rastogi.
- 14 : Molecular Biology.....V.B.Rastogi
- 15 : Histology.....Atlas.
- 16 : Cell Biology, Genetics, Molecular Biology, Evolution and Ecology.....P.S.Varma & V.K.Agrawal.
- 17 : Cytology.....P.S.Verma & V.K.Aggarwal
- 18 : Cytology, Genetics & Evolution.....P.K.Gupta

#### List of books for Unit- 4 & 5

- 19 : Wild Life of Gujarat.....H.S.Singh.
- 20 : Applied Zoology..... N Arumugam
- 21 : Applied Zoology..... Nagendra S Pawar
- 22 : Applied Entomology..... P G Fenemore
- 23 : Indian National Parks and Sanctuaries.....Khati &Annand S.
- 24 : Modern textbook of Zoology Vertebrates.....R.L.Kotpal

- 25 : Vertebrate Zoology.....E.L.Jordan & Dr.P.S.Verma
- 26 : Practical Zoology Vertebrate.....S.S.Lal
- 27 : Ecology & Environmental biology.....P.D.Sharma.
- 28 : Cell Biology, Genetics, Molecular Biology, Evolution and Ecology.....P.S.Varma & V.K.Agrawal.
- 29 : Fundamentals of Ecology.....Odum E.P. & Barrett G.W.
- 30 : Basic Concepts of Ecology.....A. Arumugam
- 31 : Elements of Ecology.....Robert & Thomas.
- 32 : Environmental Biology.....P.S.Verma & V.K.Aggrwal

#### List of Books for Viva-Voices

- 33 : Practical Zoology Invertebrate.....S.S.Lal
- 34 : Practical Zoology Vertebrate.....S.S.Lal

**Bhakta Kavi Narsinh Mehta University**  
(CBCS Syllabus)  
**SEMESTER - IV**  
**ZOOLOGY**

**PAPER – Z-04**

Chordate: Systematic, Forms & Functions, Embryology, Physiology & Reproductive Biology, Genetics & Inborn Errors of Metabolism, Evolution, Functional Anatomy of chordates & Fisheries Biology

**UNIT- 1: SYSTEMATIC:**

- 1.1 Salient features and classification up to class in Chordates with examples.
- 1.2 Archaeopteryx as a connecting link between Reptiles and Aves.
- 1.3 General account of Ratitae
- 1.4 Platypus as connecting link between Aves & Mammals.

**UNIT- 2: FORMS AND FUNCTIONS IN ANIMALS::**

**2.1 PISCES:** General account of Migration in Fishes:

- (i) Anadromous Type
- (ii) Catadromous Type

**2.2** General structure and morphology with functional anatomy of following type.

**REPTILE: Type Study – Calotes**

**2.3** Difference between Poisonous & Non-Poisonous snakes.

**2.4** To Study Following Poisonous & Non-Poisonous Snakes:

1. Rat Snake, 2. Python, 3. Sand Boa, 4. Hydrophis, 5. King Cobra, 6. Cobra, 7. Krait, 8. Russel's Viper, 9. Echis carinata

2.5 Snake bite, Anti-Venom, Preventive measures and First aid Treatment.

### **UNIT- 3: EMBRYOLOGY, PHYSIOLOGY & REPRODUCTIVE BIOLOGY:**

#### **3.1 EMBRYOLOGY:**

- (i) Types of Eggs according to yolk.
- (ii) Types of Cleavage

#### **3.2 EXCRETION:**

- (i) Nitrogenous Waste
- (ii) Structure of Nephron
- (iii) Formation of Urine
- (iv) Control of Renal Function

#### **3.3 REPRODUCTIVE BIOLOGY:**

- (i) Menopause
- (ii) Hormones of Ovary & Testis

### **UNIT- 4: GENETICS & INBORN ERRORS OF METABOLISM:**

#### **4.1 GENETICS:**

- (i) Structure of Chromosome
- (ii) Types of Chromosome according to Centromere
- (iii) Human Chromosome and Karyotyping
- (iv) Giant Chromosome:
  - 1. Polytene Chromosome
  - 2. Lampbrush Chromosome
- (v) DNA Finger printing
- (vi) Sex Determination in Drosophila, Human being and Bonellia
- (vii) Cytoplasmic Inheritance:
  - 1. Kappa Particles in Paramecium
  - 2. 4 O' Clock Mirabilis Jalapa

#### **4.2 INBORN ERRORS OF METABOLISM:**

- (i) Phenylketonuria (PKU)
- (ii) Alkaptonuria
- (iii) Albinism
- (iv) Sickle-Cell anemia

## **UNIT-5: EVOLUTION, FUNCTIONAL ANATOMY OF CHORDATES & FISHERIES BIOLOGY**

### **5.1 EVOLUTION:**

- (i) Origin and Evolution of Earth
- (ii) Isolation
- (iii) Speciation
- (iv) Evolution of Man
- (v) Morphological & Comparative anatomy of Homologous and Analogous Organs.
- (vi) Vestigial Organs of Human

### **5.2 FUNCTIONAL ANATOMY OF CHORDATES:**

- (i) Circulatory System: Origin & Evolution of Aortic arch

### **5.3 FISHERIES BIOLOGY:**

- (i) Pomfret
- (ii) Bombayduck
- (iii) Prawn
- (iv) Lobster
- (v) Pearl Oyster

## PRACTICALS RELATED ON PAPER – Z-04

### **Practical: 1 :** Identification and classification of Chordate animals.

- (i) Sub-Phylum : Urochordata : Ascidia, Doliolum, Oikopleura
- (ii) Sub-Phylum: Cephalochordata : Amphioxus
- (iii) Class: Cyclostomata : Myxine
- (iv) Super Class: Pisces : Tiger-Shark, Pristis, Trygon, Acipensor, Labeo, Protopterus

### **Practical: 2 :** Identification and classification of Chordate animals.

- (i) Class: Amphibia : Uraeotyphlus, Siren, Axolotal Larva, Rhacophorus, Hyla
- (ii) Class : Reptiles : Testudo, Sphenodon, Phrynosoma, Cobra, Crocodylus(Mugger), Gavialis(Gharial), Ophiosaurus

### **Practical: 3 :**

- (i) Class: Aves : Pigeon, Flamingo, Duck, Crow, Ostrich
- (ii) Class : Mammal : Spiny Anteater, Loris, Shrew, Rhesus Monkey

### **Practical: 4 :** To Study systems of Catoles :

- (i) External Characters
- (ii) Digestive System
- (iii) Arterial System
- (iv) Venous System
- (v) Urinogenital System
- (vi) Brain
  - Through chart or Multimedia

### **Practical: 5 :** To Study Mountings of Calotes:

- (i) Pecten
- (ii) Blood
- (iii) Striated Muscle

### **Practical: 6 :** To study Archaeopteryx as connecting link between Reptiles & Aves :

-By charts or Multimedia.

### **Practical: 7 :** To Study Migration in Fishes:



- (i) Anadromous Type : Salmon
- (ii) Catadromous Type ; Eel

**Practical: 8 :** To Study difference between Poisonous & Non-Poisonous Snakes.

1. Rat Snake, 2. Python, 3. Sand Boa, 4. Hydrophis, 5. King Cobra, 6. Cobra, 7. Krait, 8. Russel's Viper, 9. Echis carinata

**Practical: 9 :** To study types of eggs according to Yolk.

**Practical: 10 :** To study types of Cleavage.

**Practical: 11 :** To study types of Chromosomes according to Centromere.

**Practical: 12 :** To study Giant Chromosome.

**Practical: 13 :** To Study Human Chromosome & Its Karyotyping.

**Practical: 14 :** To study Evolution of Man.

**Practical: 15 :** To Study Haemologus & Analogus organs.

- (i) Talpa
- (ii) Flying Fox
- (iii) Rhesus Monkey
- (iv) Whale
- (v) Horse
- (vi) Ichthyophis
- (vii) Blind Snake

**Practical: 16 :** To Study comparative account of aortic arches.

**Practical: 17 :** To study of Important fisheries:

- (i) Pomfret
- (ii) Bombayduck
- (iii) Prawn
- (iv) Lobster
- (v) Pearl Oyster

## DISTRIBUTION OF UNITS

### SEMESTER – IV

| PAPER – Z-04 |                                                                |               |        |
|--------------|----------------------------------------------------------------|---------------|--------|
| Unit No.     | Unit Title                                                     | Theory Period | Marks. |
| Unit : 1     | Systematic                                                     | 10            | 14     |
| Unit : 2     | Forms and Functions                                            | 17            | 14     |
| Unit : 3     | Embryology, Physiology & Reproductive Biology                  | 11            | 14     |
| Unit : 4     | Genetics & Inborn Errors of Metabolism                         | 16            | 14     |
| Unit : 5     | Evolution, Functional Anatomy of chordates & Fisheries Biology | 11            | 14     |
| TOTAL :      |                                                                | 65            | 70     |

- Above statement concerned to only Theory portion of the paper.
- Above mentioned third column ‘Theory Period’ indicates total number of theory lectures per unit.
- Total syllabus should be completed within 65 theory lectures.
- Each and every units are carries equal 14 marks.
- Total marks for theory examination are 70 marks.
- **PAPER SETTER MUST FOLLOW THE UNIT WISE MARK SETUPS.**

**SAURASHTRA UNIVERSITY - RAJKOT**  
**THEORY EXAMINATION**

**SEMESTER – IV**

**ZOOLOGY**

(Based on Paper – Z-04)

**Time: 2½ Hours**

**Total Marks: 70**

**Instructions:**

1. Illustrate your answer with neat and labeled diagram.
2. Figure to the right side indicates full marks of questions.

**QUESTION-1 (THIS QUESTION IS TAKEN FROM UNIT-1)**

**QUESTION-2 (THIS QUESTION IS TAKEN FROM UNIT-2)**

**QUESTION-3 (THIS QUESTION IS TAKEN FROM UNIT-3)**

**QUESTION-4 (THIS QUESTION IS TAKEN FROM UNIT-4)**

**QUESTION-5 (THIS QUESTION IS TAKEN FROM UNIT-5)**

**- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.**

**- EACH QUESTION CARRIES EQUAL MARKS – 14.**

**- THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS**

**Each question divide in a, b and c sub question as shown below.**

- (a) Answer the following (any one out of two) [07 Marks]  
(Theory question)
- (b) Attempt any one (out of two) [04 Marks]  
(Application / Example / Problem / Theory)
- (c) Attempt any three (out of five) [03 Marks]  
(Short answer / one word / one line / true or false / fill up the blanks)

# **PRACTICAL EXAMINATION**

## **SEMESTER – IV**

## **ZOOLOGY**

(Based on Paper – Z-04)

**Time :3 Hours**

**Total Marks : 35**

- Que – 1 : Sketch and label \_\_\_\_\_ system of Calotes. [05]  
(Practical-4)
- Que – 2 : Sketch and label /Mounting of Calotes \_\_\_\_\_ [03]  
(Practical-5)
- Que – 3 : Identify and Describe about comparative account of it. [04]  
(Practical- 16)
- Que – 4: Do as per instruction and show it to examiner [03]  
(Practical – 11/12/13)
- Que – 4 : Write as per instruction. [14]  
(A) Identify and classify giving reasons.(Lower chordate)  
(B) Identify and classify giving reasons. (Higher Chordate)  
(C) Identify and describe. (Practical-6/7)  
(D) Identify and describe. (Practical- 8)  
(E) Identify and describe. (Practical- 9/10)  
(F) Identify and describe. (Practical-14/15)  
(G) Identify and describe. (Practical- 17)
- Que – 6 : Viva – voice. [03]
- Que – 7 : Certified Journal. [03]

**Bhakta Kavi Narsinh Mehta University**  
**List of Slides, Specimens, Charts, Models**  
**&**  
**Photographs**  
**SEMESTER –IV**  
**ZOOLOGY**

(Based on Paper – Z-04)

**LIST OF SLIDES:**

- (1) Doliolum, Oikopleura [Practical-1,(i)]
- (2) Mountings [Practical-5], Also available in Chart.
- (3) Types of eggs according to Yolk [Practical – 9]
- (4) Types of Cleavage. [Practical – 10]
- (5) Giant Chromosome. [Practical – 12]

**LIST OF SPECIMENS:**

- (1) All animal specimens from Sub-Phylum-Hemi Chordata to Class-Mammals. [Practical-1&2 except Doliolum & Oikopleura]
- (2) Salmon & Eel [Practical-7]
- (3) Snakes [Practical-8]
- (4) Homologus & Analogus Organs[Practical-15]
- (5) Fisheries [Practical-17]

**LIST OF CHARTS/MODELS/PHOTOGRAPHS:**

- (1) Systems of Calotes [Practical-4]
- (2) Archaeopteryx [Practical-6]
- (3) Types of Chromosome according to centromere [Practical-11]
- (4) Giant Chromosomes [Practical-12]
- (5) Human Chromosomes & Its Karyotyping [Practical-13]

(6) Evolution of Man [Practical-14]

(7) Aortic arches: Origin, Evolution & Comparative account of it. [Practical-16]

## REFERENCE BOOKS

### SEMESTER – IV

#### List of Books for Unit -1 & 2

- 1 : Chordate Zoology .....E.L.Jordan & Dr.P.S.Verma
- 2 : Modern textbook of Zoology Vertebrates .....R.L.Kotpal.
- 3 : Chordate Embryology.....P.S.Verma & V.K.Agraval
- 4 : A manual of practical Zoology, Vertebrates.....P.S.Verma
- 5 : Practical Zoology, Vertebrates.....S.S.Lal

#### List of Books for Unit - 3

- 6 : Animal Physiology.....P.K.Gupta.
- 7 : Animal Physiology.....V.K.Agrawal.
- 8 : Animal Physiology.....M.P.Arora
- 9 : A textbook of Animal Physiology.....Tyagi Prasm
- 10 : Human Physiology, Vol- I & II.....Chatterjee C.C.
- 11 : A text book of Animal Physiology.....A.K.Berry & K.Berry
- 12 : Animal Physiology & Bio-Chemistry.....R.A.Agrawal & Anil k. Shrivastva & Kaushal Kumar
- 13 : Chordate Embryology.....P.S.Verma & V.K.Agraval

#### List of Books for Unit – 4

- 14 : Principle of Genetics.....Gardner.
- 15 : Genetics.....P.S.Varma & V.K.Agrawal.
- 16 : Problems on Genetics, Molecular Genetics & Evolutionary Genetics....  
.....Dr. P.K.Banerjee.
- 17 : Genetics & Biostatistics.....Meyyan.
- 18 : Cell Biology, Genetics, Molecular Biology, Evolution & Ecology.....P.S.Verma & V.K.Agrawal.
- 19 : Cytology, Genetics & Evolution.....P.K.Gupta

#### List of Books for Unit – 5

- 20 : Organic Evolution .....Dr. N. Arumugam.



- 21 : Evolution.....Veerbala Rastogi.  
22 : Chordate Zoology.....E.L.Jordan & Dr.P.S.Verma  
23 : Modern textbook of Zoology Vertebrates .....R.L.Kotpal.  
24 : Fisheries Biology.....S S Khanna & H R Singh

List of Books for Viva-Voice

- 35 : Practical Zoology Invertebrate.....S.S.Lal  
36 : Practical Zoology Vertebrate.....S.S.Lal