

Krantiguru Shyamji Krishna Verma

# Kachchh University

Mundra Road

Bhuj – 370001

Effective from June 2016

## SYLLABUS

**B.Sc Semester VI: (Six)**

# ZOOLOGY

Three papers:

Semester – VI (Three papers)
<b>CEZO -610: Non chordate, Pollution, Population dynamics and Immunology</b>
<b>CEZO -611: Economic Zoology and Biotechnology</b>
<b>CEZO -612: Endocrinology, Physiology and Ethology</b>

**KSKV Kachchh University, Bhuj - Kachchh**

**Zoology Syllabus as CBCS System**

**Semester -VI**

**Paper 610 (Theory)**

**CEZO -610: Non chordate, Pollution, Population dynamics and Immunology**

Total Marks: 60

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**UNIT I: Animal diversity (Non Chordata) :Type study and general topic (15 Marks)**

*Arthropoda* : Type – **Cockroach** (*Periplaneta americana*) – Classification, Habits & Habitat, Ext. characters, Digestive system, excretory system, Reproductive systems, Nervous system, and Sense organ (only compound eyes).

**UNIT II: Pollution**

Definition and present scenario

1. Air Pollution: Causes and major pollutants (Gaseous and Particulate), Smog, Effect on health
2. Water Pollution: Sources and pollutants (Biological organisms (bacteria & protozoa), acids, alkalies, dyes, hydrogen sulphide, pesticides, fertilizers, toxic metals (Fluoride, Hg, Arsenic), faeces, domestic wastes, and suspended matters)
3. Soil/Land Pollution: a) Industrial solid wastes - Toxic metals like Cu, Pb, Ni.  
b) Solid wastes - Garbage, paper, glasses, metal cans, plastics, faeces.  
c) Agricultural sources - Wastes from cattle sheds & poultry farms, fertilizers, pesticides and fumigants.
4. Radioactive pollution and its management ( In general)
5. Biological treatment of effluents.

**UNIT III: Population ecology**

**(15 Marks)**

- Introduction,
- Population pyramids (Age pyramids), factors affecting population
- Metapopulation, Alpha, Beta and Gamma diversity
- Field study/Sampling methods: Quadrant, Transect sampling (line and belt transect), block counts (for birds), point count, For insects (pit fall trap, light trap, Sticky traps, sweep netting etc.), Plankton sampling.

**UNIT IV: Toxicology and Immunology**

**(15 Marks)**

1. Toxicology: Definition of Toxicology, toxicant. Type of toxicity (Acute, sub-acute, chronic), Factors affecting Toxicity: Size of animal, Age, Sex, Species, Strain, Feed & Feeding, dosage, Route & Rate of administration, Environment. Entry of toxicants into the animal's body: Gastro-intestinal route, Skin, Lungs, Parenteral administration.
2. Immunology: Definition, Antigen – Antibodies (Definition & Characteristics ), Human immune system (Skin, lymph, blood, T-cells, B – Cells, Spleen, monoclonal antibodies)

Immunity disorders: Hypersensitivity (allergy), Tissue rejection, Autoimmune diseases, AIDS.

**Reference Books:**

**Invertebrates** by **R. L. Kotpal**

**Fundamentals of Ecology**, P. S. Odum, Saunders.

**Ecology and Environment**, P. D. Sharma, Rastogi Publications, Meerut.

**Environmental Pollution (Popular Science)** , N. Manivasakan, National Book Trust, New Delhi.

**Principles of Anatomy and Physiology**, Tortora and Anagnostakos, HarperCollins College Publishers, 4th Edition

**Immunology** by Kuby

## Structure of the Question Paper for University exam

Semester VI (Zoology) Paper No.

CEZO -610: Non chordate, Pollution, Population dynamics and Immunology

Total Mark: 60 (Total 4 units each carries 15 Marks)

Total Number of Question: 04

Question No.	Sub Question	Question Type	Mark
Question 1	A	*Short question (no internal option)	05
Unit I	B	Descriptive Questions with Internal Option	10
Question 2	A	Short question (No internal Option)	05
Unit II	B	Descriptive Questions with Internal Option	10
Question 3	A	Short question (No internal Option)	05
Unit III	B	Descriptive Questions with Internal Option)	10
Question 4	A	Short question (No internal Option)	05
Unit IV	B	Descriptive Questions with Internal Option	10

**Note:** Short questions may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc)

- The examination pattern of the university is 60% external and 40% internal
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- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
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**KSKV Kachchh University, Bhuj - Kachchh**

**Zoology Semester VI**

**Paper No.CEZO-610**

**CEZO -610: Non chordate, Pollution, Population dynamics and Immunology**

**(PRACTICAL)**

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Practical 1: Study of external characteristics of cockroach

Practical 2: Study of digestive system of cockroach

Practical 3: Study of Nervous system of cockroach

Practical 4: Temporary mountings of salivary glands, cornea of compound eyes.

Practical 5: Estimation of Total solids (TS), Total dissolved solids (TDS) & total suspended solids (TSS) from water sample.

Practical 6: Estimation of Dissolved oxygen in given water sample.

Practical 7: Study of various sampling methods for field studies.

Practical 8: Study of parts of immune system – T. S through Lymph node, T.S through spleen & Structure of antibody. (Through charts and slides)

Practical 9: Visit to a local polluted site/ Solid waste centre/ Effluent Treatment plant and report writing. (*Self study*)

*(Practical -9 report carries separate marks. Student should have his/her own representation of ideas based on the actual visit and should not be merely a copy)*

# KSKV Kachchh University, Bhuj - Kachchh

## (SKELETON QUESTION PAPER FOR PRACTICAL EXAMINATION)

### CEZO -610: Non chordate, Pollution, Population dynamics and Immunology

Date: \_\_\_\_\_

Total Marks: 30

Time: .....

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#### Session - I

Q.1 Draw a labeled diagram of \_\_\_\_\_ of cockroach and explain to the examiner. 07

Q.2 Estimation/Calculation of TS/TDS/TSS or Dissolved Oxygen from the given sample/data.  
(Test Performance or problem solving) 06

#### Session -II

Q.3 Identify specimens A to C as per instructions: 08

1. Identify and describe given sampling method
2. Based on the given diagram/condition give suitable sampling method
3. Identify the given diagram and write its immunological importance
4. Identify and describe as per asked.

Q.4. Local visit report (As per Practical -9) 03

Q.4. Viva voice 03

Q.5 Journal 03

**KSKV Kachchh University, Bhuj - Kachchh**

**Zoology Syllabus as CBCS System**

**Semester -VI**

**Paper 611 (Theory)**

**CEZO -611: Economic Zoology and Biotechnology**

Total Marks: 60

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**UNIT I: Apiculture**

**15 Marks**

1. Introduction.
2. Classification of *Apis*.
3. Different species of honey bees.
4. Social structure & life history in honey bees.
6. A typical bee hive, Modern methods of bee farming
7. Communication in honey bees.

**UNIT II: Sericulture**

**15 Marks**

1. Introduction.
2. Classification of *Bombyx mori*.
3. Introduction to different species of silkworms used for sericulture.
4. External features and Life cycle of *Bombyx mori*.
5. Sericulture industry: - Requirements for sericulture. - Mulberry. - Rearing of silkworm : Grainage management. - Post-cocoon processing. 2. Chemistry and uses of silk.

**UNIT III: Fisheries**

**15 Marks**

1. Economic importance of fisheries
2. Induced breeding (only concept for short question)
3. Pond management
4. Processing and preservation of fishes
5. Modern and traditional fishing gears

**UNIT IV: Biotechnology**

**15 Marks**

1. Introduction of Biotechnology
2. Structure of DNA and genetic code
3. Construction of recombinant DNA in vitro.
4. Preparation of desired DNA
5. Plant & animal tissue culture overview
6. Human genome project - Overview

**Reference books**

**Elements of Biotechnology**, P. K. Gupta, S. Chand & Company, Delhi

**Economic Zoology**, G. S. Shukla and V. B. Upadhyay, Rastogi Publications, Meerut.

**Economic and Applied Entomology**, Kumar and Nigam, Emkay Pub., Delhi.

## Structure of the Question Paper for University exam

Semester VI (Zoology) Paper No.

CEZO -611: Economic Zoology and Biotechnology

Total Mark: 60 (Total 4 units each carries 15 Marks)

Total Number of Question: 04

Question No.	Sub Question	Question Type	Mark
Question 1	A	*Short question (no internal option)	05
Unit I	B	Descriptive Questions with Internal Option	10
Question 2	A	Short question (No internal Option)	05
Unit II	B	Descriptive Questions with Internal Option	10
Question 3	A	Short question (No internal Option)	05
Unit III	B	Descriptive Questions with Internal Option)	10
Question 4	A	Short question (No internal Option)	05
Unit IV	B	Descriptive Questions with Internal Option	10

**Note:** Short questions may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc)

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**KSKV Kachchh University, Bhuj - Kachchh**

**Zoology Semester VI**

**Paper No.CEZO-611**

**CEZO -611: Economic Zoology and Biotechnology**

**(PRACTICAL)**

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Practical 1: Study of social structure of honey bee. (Using specimen/chart/photograph)

Practical 2: Study of modern and traditional bee keeping methods. (*by charts /specimens*)

Practical 3: Study of *Bombax mori* and life cycle (*by charts /specimens*)

Practical 4: Study of economically important freshwater fishes of Gujarat/India. (*by charts /specimens*)

Practical 5: Study of economically important marine fishes of Gujarat/India. (*by charts /specimens*)

Practical 6: Methods of processing and preservation of fish. (*by charts /specimens*)

Practical 7: Study of some modern and traditional fishing gears. (*by charts /specimens*)

Practical 8: Study of Classical organ culture technique (*by charts*)

# KSKV Kachchh University, Bhuj - Kachchh

## (SKELETON QUESTION PAPER FOR PRACTICAL EXAMINATION)

### CEZO -611: Economic Zoology and Biotechnology

Date: \_\_\_\_\_

Total Marks: 30

Time: .....

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Q.1 Draw a labeled diagram of life cycle of \_\_\_\_\_ with social structure and explain to the examiner. 07

Q.2 Based on the given diagram identify the method and describe ----(*Fish processing/preservation*) 05

Q.3 Identify specimens A to F as per instructions: 12

- A. Identify and describe - (Sericulture)
- B. Identify and describe method - (Apiculture)
- C. Identify and describe --- (fishing gear)
- D. Identify and describe - Economically important Fish
- E. Identify and describe – Biotechnology
- F. Identify and describe

Q.4. Viva voice 03

Q.5 Journal 03

**KSKV Kachchh University, Bhuj - Kachchh**

**Zoology Syllabus as CBCS System**

**Semester -VI**

**Paper 612 (Theory)**

**CEZO -612: Endocrinology, Physiology and Ethology**

Total Marks: 60

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**UNIT I: Endocrinology (15 Marks)**

- Introduction to Endocrine system
- Hormones: Definition, characteristics of hormones
- Structure and function of Endocrine glands: Pituitary; Thyroid; Adrenal; Endocrine pancreas
- Action and Feedback mechanism of Hormones

**UNIT II: Physiology**

1. Blood: Composition of blood, functions of blood
  - a. Mechanism of blood clotting
2. Nervous system and Coordination: Body control and coordination (overview), comparison of Nervous system and Endocrine system, Nerve cell, synapse, Reflex action and centers, Neuro muscular coordination (overview)

**UNIT III: Behaviour and Ethology**

1. Learning: Habituation,
2. Waggle dance in honey bee, colour learning
3. *Homing behavior in wasps*
4. Altruism: description and benefits. Examples In bees, bats, invertebrates, mammals
5. Reproductive behavior patterns: Lekking, lekking behavior and species, monogamy, polygamy, courtship displays (Colouration, sound, luring, appearance and dance, power etc.), mate selection.

**UNIT IV:**

- Type of bird nests
- Muscle physiology and fatigue
- Types of Placentation in mammals (histological), Types of twins
- Some genetic disorders: Polycystic kidney disease, Huntington's disease, Phenylketonuria, Glycogen storage diseases, Sickle cell anaemia,

**Reference Books:**

1. **Animal Behaviour by Mohan P Arora.**
2. **Principles of Anatomy and Physiology**, Tortora and Anagnostakos, HarperCollins College Publishers, 4th Edition.
3. **Textbook of Animal Physiology**, A. K. Berry, Emkay Pub., New Delhi.
4. **A Textbook of Animal Histology**, A. K. Berry, Emkay Publications, Delhi.

## Structure of the Question Paper for University exam

Semester VI (Zoology) Paper No.

CEZO -612: Endocrinology, Physiology and Ethology

Total Mark: 60 (Total 4 units each carries 15 Marks)

Total Number of Question: 04

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Unit II	B	Descriptive Questions with Internal Option	10
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**KSKV Kachchh University, Bhuj - Kachchh**  
**Zoology Semester VI**  
**Paper No.CEZO-612**  
**CEZO -612: Endocrinology, Physiology and Ethology**

**(PRACTICAL)**

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Practical 1: To study the position and function of endocrine glands in human body.

Practical 2: Determination of blood clotting time of own blood.

Practical 3: Determination of your own bleeding time.

Practical 3: Preparation of blood smear.

Practical 4: Preparation of haemin crystal from own blood.

Practical 3: To study neuro muscular coordination and reflexes. (through various activities)

Practical 4: Study of habituation using maze experiment.

Practical 5: Study of different types of nests.

Practical 6: Study of structure of different type of muscles (through slides/diagrams)

Practical 7: Observation of different type of some common animal behavior /displays. (Self study).

**KSKV Kachchh University, Bhuj - Kachchh**  
**(SKELETON QUESTION PAPER FOR PRACTICAL EXAMINATION)**

**CEZO -612: Endocrinology, Physiology and Ethology**

**Date:** \_\_\_\_\_

**Total Marks: 30**

**Time: .....**

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**Session -I**

- Q.1 Perform \_\_\_\_\_ practical using own blood writing methodology, principle and explain to the examiner. 06
- Q.2 Give/identify location and function of asked endocrine gland. 03

**Session - II**

- Q.3 Prepare slide demonstrating haemin crystal or blood smear and show to examiner 06
- Q.4. Identify specimens A to C as per instructions: 09
- A. Identify and describe ----(type of Nest)
  - B. Identify and describe --- (type of muscles)
  - C. Describe the given behavioural aspect
- Q.4. Viva voice 03
- Q.5 Journal 03