

Krantiguru Shyamji Krishna Verma

Kachchh University

Mundra Road

Bhuj – 370001

Effective from June 2011

SYLLABUS

B.Sc Semester I (One)

ZOOLOGY

One papers per Semester:

Semester - I
ZO 101: Animal Diversity and Cytogenetics

KSKV Kachchh University, Bhuj – Kachchh
Zoology Syllabus as CBCS System
Semester I (w.e.f. June 2011)
CEZO 101: Animal Diversity and Cytogenetics

Total Marks : 60

Unit I Animal Diversity – Systematic (Non-chordates): **[15]**

1. Introduction to Zoology: Branches and Applications
2. Career prospects in Zoology
3. Introduction to Systematic/Taxonomy and its Applications
4. Salient features and classification up to classes of non-chordates (excluding minor phylum) with suitable example (See list in practical paper).

Phylum

- Protozoa
- Coelenterata
- Porifera
- Platyhelminthes
- Nemathelminthes
- Annelida

(General Classification as per Whittaker's Five Kingdom Classification and Phylum Classification as per adapted in invertebrate Series by R. L. Kotpal, , Rastogi Publication Meerut)

Unit II Type study (Non-chordates): **[15]**

General structures and morphology with functional anatomy of following Type animals.

- Phylum : Protozoa: Type – Amoeba (Structure , Locomotion, Nutrition, Excretion, Osmoregulation, Reproduction).
- Phylum : Coelenterata: Type – Hydra (Morphology, Locomotion, Histology, Nutrition, Nervous system, Reproduction
- Phylum : Annelida : Type – Earthworm (Pheretima) (External character, Digestive system, Nervous system, Excretory system and Reproductive system

Unit III Cytology: **[15]**

1. Nucleus:
 - Occurrence and Position,
 - Morphology
 - Ultra structure
2. Endoplasmic Reticulum
 - Occurrence
 - Morphology
 - Ultrastructure

- Types of Endoplasmic reticulum
- Functions of Endoplasmic reticulum.
- 3. Eukaryotic Ribosome
 - Occurrence and distribution
 - Types of Ribosome
 - Structure of Ribosome
 - Functions.
- 4. Mitochondria.
 - Structure
 - Functions

Unit IV Genetics

[15]

1. Introduction to Gene
2. Introduction to Mendelian laws of Heredity.
3. Incomplete dominance
4. Co-dominance
5. Multiple alleles
6. ABO blood groups in humans,
 - Rh Factor- Definition

The Structure of the Question Paper for the University exam

Semester I (Zoology) Paper no : CEZO 101

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

Total Number of Question: 04

Question No.	Sub Question	Question Type	Mark
Question 1 Unit I	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 2 Unit II	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 3 Unit III	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 4 Unit IV	a	Short question (No internal Option)	05
	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
- Each theory paper will have 4 lecture in a week and a practical will have 6 lecture per batch in a week.
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal have to produced while appearing at the time of Practical examination.

KSKV Kachchh University, Bhuj – Kachchh

Zoology Semester I

Paper No.CEZO– 101: Animal Diversity and Cytogenetics

(PRACTICALS)

Practical 1 : To study Phylum Protozoa: Amoeba, Paramoecium,

Polystomella/Foraminifer, Euglena, Opalina, Vorticella.

Practical 2 : To study Phylum Porifera: Leucosolenia, Euspongia, Grantia.

Practical 3 : To study Phylum Coelenterata: Hydra, Obelia, Physalia, Aurelia,

Gorgonia, Coral and Sea anemone.

Practical 4 : To study Phylum Platyhelminthes: Planaria, Liverfluke, Tape worm.

Practical 5: To study Phylum Nematoda : Enterobius, Ascaris.

Practical 6: To study Phylum Annelida: Earthworm, Nereis, Aphrodite, Arenicola,

Sabella, Leech.

Practical 7: To study external characters of Earthworm (Through chart/multimedia)

Practical 8: To study Digestive system of Earthworm & Mounting of Spermatheca, setae and Septal Nephridia (Through chart/multimedia)

Practical 9: To study Nervous system of Earthworm (Through chart/multimedia)

Practical 10: To study Reproductive system of Earthworm (Through chart/multimedia)

Practical 11: Study of Compound Microscope

Practical 12: Study of cell organelles –Nucleus, Endoplasmic reticulum, Ribosomes and mitochondria (Through charts/pictures)

Practical 13: Study of genetic problems i). Monohybrid cross ii). Dihybrid cross iii). Blood group (Problem solving)

Journal / Submission

- **Note:** This is compulsory to record laboratory work (all practicals) in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.

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

Semester-I

ZOOLOGY (101): Animal Diversity and Cytogenetics

Date: _____

Total Marks: 30

Exercise -I

Q.1 Draw/Demonstrate & explain the _____ system of Earthworm. **07**

Q.2 Show how to prepare temporary mounting of _____ from Earthworm and show to examiner. **03**

Q.3. Solve the given genetics problem **02**

Exercise - II

Q.3 Identify specimens 1 to 6 as per instructions: **12**

1. Identify and classify giving reasons

2. Identify and classify giving reason

3. Identify and describe

4. Identify and do as directed

5. Identify and do as directed

6. Identify and do as directed

Q.4. Viva voice **03**

Q.6 Journal **03**

Krantiguru Shyamji Krishna Verma

Kachchh University

Mundra Road

Bhuj – 370001

Effective from June 2011

SYLLABUS

B.Sc Semester II (Two)

ZOOLOGY

One papers per Semester:

Semester - II
ZO- 202: Anatomy, Histology, Physiology, Ecology & Behavior

KSKV Kachchh University, Bhuj – Kachchh
F.Y. B.Sc. (Zoology) Syllabus as CBCS System
Semester II (w.e.f. June 2011)

CEZO 202: Anatomy, Histology, Physiology, Ecology & Behaviour

Total Marks: 60

Unit I. Animal Diversity – Systematic

[15]

1. **Systematics** : Salient features and classification up to class of given non chordates(exclude minor phyla) with suitable examples (See list in practical paper)

Phylum:

- Arthropoda
- Mollusca
- Echinodermata
- Hemichordata

(General Classification as per Whittaker's Five Kingdom Classification and Phylum Classification as per adapted in invertebrate Series by R. L. Kotpal, , Rastogi Publication Meerut)

UNIT II. Anatomy and Histology

[15]

1. Definition in mammals.
 - Structure of teeth
 - Type of teeth
 - Dental formulae (eg. Man, Rabbit, Cow, Dog, Elephant, Horse)
2. Mammalian Skin and it derivatives:
 - Structure (V.S.) : Epidermis and Dermis
 - Derivatives (eg. Sweat gland, Oil gland, Scent gland, Mammary gland, Claw , Nail, hoof, Horn and Hair)
3. Histology of Mammalian Organs :
 - Types of tissues
 - Mammalian stomach
 - Mammalian Intestine
 - Mammalian Liver
 - Mammalian Pancreas

UNIT III. Physiology:

[15]

1. Nutrition

- Definition, Types of Nutrition- Autotrophic and Heterotrophic (Holozoic, Saprophytic, and Parasitic)
 - Digestion and Absorption of carbohydrates, Proteins and Lipids
- Common disorder: Hyperacidity, Ulcer, Amoebic dysentery

2. General Topics

- Vitamins & Trace elements (Iron, Iodine, Cu, Zn, K, Mg, Mn, Ca, Cl): Sources and Importance
- Role of sex hormones in human beings
 - Male : Testosterone
 - Female : Estrogen, Progesterone

UNIT IV. Ecology and Animal Behaviours

[15]

1. Ecology

- Abiotic and Biotic factor of Ecosystem
- Food Chain
- Food web
- Energy flow

2. Animal Behaviour

- Define Behaviour
- Types of behaviour (Innate, Learning, Imprinting, Habituation, Conditioning,
- Social Behaviour: Importance, group structure, Territory marking, Division of work, Altruism, Group protection, Group hunting, communication in group (Calls, alarms, displays, pheromones). *(Includes suitable examples)*
- Reproductive Behaviour: Need of Reproductive behavior, Methods of courtship behaviour (Calls, displays, colouration, Luring, Pheromones), Territory marking, Fights. *(Includes suitable examples)*

The Structure of the Question Paper for the University exam

Semester I (Zoology) Paper no : CEZO 202

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

Total Number of Question: 04

Question No.	Sub Question	Question Type	Mark
Question 1 Unit I	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 2 Unit II	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 3 Unit III	a	Short question (No internal Option)	05
	b	Descriptive Questions with Internal Option	10
Question 4 Unit IV	a	Short question (No internal Option)	05
	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
- Each theory paper will have 4 lecture in a week and a practical will have 6 lecture per batch in a week.
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal have to produced while appearing at the time of Practical examination.

KSKV Kachchh University, Bhuj – Kachchh

Zoology Semester II

Paper No.CEZO– 202: Anatomy, Histology, Physiology, Ecology & Behaviour

(PRACTICALS)

Identification and Classification of Non –chordates (Up to class).

The basic aim to introduce the animal diversity and identification skill of student.

Practical 1: To study Phylum Arthropoda : Apus, Cyclops, Balanus, Sacculina, Prawn, Crab, Lobster, Scorpion, Daphnia, Spider, Rat-flea.

Practical 2: To study Phylum Mollusca : Chiton, Dentalium, Pila, Aplysia, Unio, Octopus, Sepia, Cowry, Oyster

Practical 3: To study Phylum Echinodermata: Brittle star, Sea urchin, Sea cucumber, Feather star, Starfish.

Practical 4: To study Phylum Hemichordata: Balanoglossus

Practical 5: To study histological permanent slides/sections (Through charts/slides)
T.S. mammalian Stomach , Intestine, Liver, Pancreas.

Practical 6: Structure of Human Tooth (V.S. Molar)

Practical 7: To study type of teeth (Incisor, Canine, Premolar, molar) & Dental formulae (eg. Man Rabbit, Dog, Elephant, Horse)

Practical 8: Mammalian Skin and its derivatives (eg. Sweat gland, Claw, Nail, Hoof, Horn and Hair)

Field Report

Journal / Submission

- **Note:** This is compulsory to record laboratory work (all practicals) in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.

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

Semester-II

ZOOLOGY (202): Anatomy, Histology, Physiology, Ecology & Behavior

Date: _____

Total Marks: 30

Exercise -I

Q.1 Draw, label & explain to the examiner T.S. of _____. **07**

Q.2 Draw labeled diagram of _____. **03**

Q.3. Give the dental formula (2 animals) **02**

Exercise - II

Q.3 Identify specimens 1 to 6 as per instructions: **12**

1. Identify and classify giving reasons

2. Identify and classify giving reason

3. Identify and describe

4. Identify and do as directed

5. Identify and do as directed

6. Identify and do as directed

Q.4. Viva voice **03**

Q.6 Journal **03**

Krantiguru Shyamji Krishna Verma

Kachchh University

Mundra Road

Bhuj – 370001

SYLLABUS

B.Sc Semester III: (Three)

ZOOLOGY

Two papers:

Semester – III Two papers
CEZO-303: Animal Diversity (Chordata) and Cytology.
CEZO-304: Ecology, Wildlife and Environmental issues.



UNIT I: Animal diversity (Chordata)

(15 Marks)

Salient features and classification of chordates from Kingdom to Order,

1. Amphibia: Frog, Toad, Hyla, Salamander, Caecilians (Ichthyophis)
2. Pisces: Shark, Rohu, Ray fish, Mudskipper, Cat fish, Catla, Sting ray, Sea horse, Suckerfish, Eel.

(The said animals should be taught in practical while classification, characteristics of upto order level, animals included in order as well as habitat should be included in theory)

UNIT II: Type study – Chordata (through charts/ models/ multimedia)

(15 Marks)

1. Shark (*Scoliodon sorrakowah*): External characters, digestive system, circulatory system, Nervous system, Urinogenital system
-Sense organs (Membranous labrynth and Ampulla of Lorenzini)
2. Comparison of Elasmobranch and Bony fishes

UNIT III: General Topics

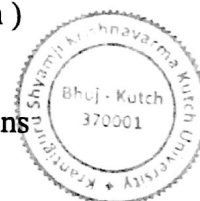
(15 Marks)

1. Types of scales in fish
2. Types of fins in fish
3. Common snakes of India
 - 3.1. Identification and study of Venomous and non-venomous snakes of India.
Venomous snakes: Cobra, King cobra, Krait, Russel's and saw scaled viper, Sea snakes.
Non-venomous: Rat snake, python, wolf snake , checkered keel back.
Type of snake venoms: Neurotoxic, hemotoxic and neuro-hemo toxic
 - 3.2. Snake bite mechanism, Primary treatment and Remedies

UNIT IV: Cytology

(15 Marks)

- Cytoskeleton (Definition, Importance, type of cytoskeleton, function)
- Lysosomes: Ultra structure, types and function
- Cancer cells : General characteristics and nature, potential carcinogens
- Programmed cell death: In general



Reference Books:

Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut

Chordata Zoology by E. L Jordan and P. S. Verma

Integrated Principles of Zoology by Hickman

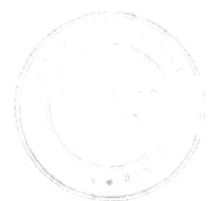
Cellular and Molecular Biology by De Robertis

Cytology by P. K. Gupta, S. Chand & Company, Delhi

Textbook of Cytology by Dalela and Verma

Jiv-Vigyan by Nirav Prakashan

Sankes of India By Wittecker



The Structure of the Question Paper for the University exam

Semester III (Zoology) Paper no: CEZO303

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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.



KSKV Kachchh University, Bhuj - Kachchh

Zoology Semester III

Paper No.CEZO– 303: Animal Diversity (Chordata) and Cytology (PRACTICALS)

Identification and classification upto order giving reasons (Practical 1-2)

Practical 1: Classification of Class Amphibia: Frog, Bufo, Hyla, Salamander, Ichthyophis, Axolotal larva.

Practical 2: Classification of Super Class Pisces: Shark, Rohu, Ray fish, Mudskipper, Cat fish, Hippocampus, Eel, suckerfish.

(Along with classification scientific name, short description and habitat should be given)

Practical 3: Type study (Chordata). Study of Shark (*Scoliodon sorrakowah*) (Using charts/multimedia/models)

3.1 Study of external characteristics of shark

3.2 Study of digestive system of shark

3.3 Study of circulatory system of shark

3.4 Study of Nervous system of shark

3.5 Mountings (Membranous labrynth and Ampulla of Lorenzini)

Practical 4: Study of scales in fishes (through charts/slides)

Practical 6: Study of fins in fishes (Through charts and specimens)

Practical 7: To study poisonous and non poisonous snakes (Through charts, keys and specimens – as per theory) Cobra, Krait, saw scaled viper, Russel's viper, Checkered keel back, rat snake.

Local excursion/self study – with report

Journal submission

Instructions:

- **The Zoological excursion is compulsory to study the ecosystem, Animal behavior and their life style for the students.**
- Excursion report is mandatory for all the students and marks will be calculated in practical examination
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.



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

ZOOLOGY (303): Animal Diversity (Chordata) and Cytology

Date: _____

Total Marks: 30

Time: 4 hours

Q.1 Draw/Demonstrate & explain the _____ system of the given animal to examiner. **07**

Q.2 Show how to prepare temporary mounting of _____ from shark and show to examiner. **03**

Q.3 Identify specimens 1 to 6 as per instructions: **12**

1. Identify and classify giving reason

2. Identify and classify giving reason

3. Identify and describe

4. Identify and do as directed

5. Identify and do as directed

6. Identify and do as directed

Q.4. Viva voice

03

Q. 5 Report /submission

02

Q.5 Journal

03



KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as CBCS System

Semester -III

Paper 304 (Theory)

Total Marks-60

CEZO- 304: Ecology, Wildlife and Environmental issues

UNIT I: Ecology

(15 Marks)

- 1 Study of different ecosystems; (Characteristics, zonations, flora and fauna, community pattern, trophic levels)
 - Forest ecosystem
 - Grassland ecosystem
 - Aquatic ecosystem (Lentic and Lotic)
 - Marine ecosystem
2. Succession in aquatic ecosystem and terrestrial ecosystem
3. Key stone species, Umbrella species, and Flagship species (with examples of each)

UNIT II: Wildlife Biology

(15 Marks)

1 National Park and Sanctuaries

Example studies: Gir National Park, Marine National Park, Velavadar National Park, Jim Corbett National Park, Wild Ass Sanctuary.

2. Tools for Wildlife study: Binoculars, Cameras, Radio transmitters/ receivers, Tranquilizers (guns and darts), Camera traps.

3. Wildlife Conservation:

- Indian Wildlife Act

- IUCN Red list categories

- Endangered Fauna (With Scientific name and status): Asiatic lion, Indian Wild ass, Tiger, Leopard, Great Indian Bustard, One horned Rhino, Gangetic dolphin, Vultures)

UNIT III: Current Environmental Issues

(15 Marks)

1. Deforestation, Habitat destruction, Over exploitation of resources.

2. Global Warming and Green House effect: Causative gases, Climate change, possible effects, Sea level change, Ozone depletion

i. Plastic pollution: Effect of plastic on ecosystem, effect on animals. Best practices.

3. Rain Water Harvesting (Importance of RWH, various methods of RWH)



UNIT IV: Basic Biostatistics

(15 Marks)

1. Importance of Biostatistics in biological studies
2. Mean , Median, Mode
3. Standard deviation

Reference Books:

Threatened animals of India, B. K. Tikader, ZSI, Calcutta

T. C. Cell Biology, Genetics, Evolution and Ecology

Wildlife of India, Mark E. Trisch, HarperCollins Pub.

Modern Text book of Vertebrates by R. L. Kotpal

Fish and Fisheries of India, V. B. Jhingran, Hindustan Pub., Meerut



The Structure of the Question Paper for the University exam

Semester III (Zoology) Paper no: CE ZO 304

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

Total Number of Question: 04

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

- Minimum length of the submission is printed five A4 size pages.
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.



KSKV Kachchh University, Bhuj - Kachchh
Zoology Syllabus as CBCS System
Zoology Semester –III (PRACTICALS)
CEZO 304 Ecology, Wildlife and Environmental issues

Study through charts and/or nearby ecosystem visit Practical 1 to 3

Practical 1: Study of wetland ecosystem

Practical 2: Study of Forest ecosystem

Practical 3: Study of Marine ecosystem

Practical 4: Plotting of important national Parks and Sanctuaries on map.

Practical 5: Study of wildlife tools: Binoculars, Tranquilizers (Guns and darts), Radio transmitters and receivers.

Practical 6: Study of collection and identification of common animals pugmarks.

Practical 7: Study of selected endangered animals (using IUCN or wildlife act categories) of India

Practical 8: Study of selected endangered animals of Gujarat (using IUCN or wildlife act categories)

Practical 9: Study of biostatistics-mean, median, mode. (with the practical examples and problem solving)

Practical 10: Basics of biostatics: Standard deviation (by problem solving).

Study tour Report

Journal Submission

Instructions:

- **The Zoological excursion is compulsory to study the ecosystem, Animal behavior and their life style for the students.**
- Excursion report is mandatory for all the students and marks will be calculated in practical examination
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.



KSKV Kachchh University, Bhuj - Kachchh
(SKELETON QUESTION PAPER FOR PRACTICAL EXAMINATION)
ZOOLOGY (304): Ecology, Wildlife and Environmental issues

Date: _____

Total Marks: 30

Time: 4 hours

- | | |
|--|----|
| Q.1 Design/Draw/model the _____ ecosystem as asked. | 05 |
| Q.2 Plot the asked National Parks and Sanctuaries on the given map. | 04 |
| Q.3 Show the distribution of (<u>endangered animals</u>) on given map. | 03 |
| Q. 4. Solve the given biostatistics problem. | 03 |
| Q.3 Identify specimens 1 to 3 as per instructions: | 06 |
| <ol style="list-style-type: none">1. Identify and do as directed -- wildlife tool2. Identify and write IUCN status of the animal3. Identify the pugmark of an animal | |
| Q.4. Viva voice | 03 |
| Q. 5 Report /submission | 03 |
| Q.5 Journal | 03 |



Krantiguru Shyamji Krishna Verma

Kachchh University

Mundra Road

Bhuj – 370001

SYLLABUS

B.Sc Semester IV: (Four)

ZOOLOGY

Two papers:

Semester - IV
ZO-405: Animal Diversity, Parasitology and Genetics.
ZO-406: Animal adaptations, Zoogeography and Developmental biology.



KSKV Kachchh University, Bhuj
ZOOLOGY Syllabus
Semester-IV

(Theory)

ZO-405: Animal Diversity, Parasitology and Genetics

Total Marks: 60

UNIT I: Animal diversity (Chordata)

(15 Marks)

Study of following chordate groups along with their salient features, classification from Kingdom to Order along with suitable examples;

- i. Reptiles
- ii. Aves
- iii. Mammals

UNIT II: Type study – Chordata (through charts/ models/ multimedia) (15 Marks)

Calotis (*Calotis versicolor*): Indian Garden lizard

- i. External characters
- ii. Digestive system
- iii. Circulatory system
- iv. Mounting – Pectin and Hyoid apparatus

UNIT III: Human Parasitology

(15 Marks)

1. Basic Terminologies: Parasite, Host and Parasitology (Only for short questions)
2. Types of Parasites: Facultative, Obligate, Endoparasites and Ectoparasites
3. Types of Hosts: Principal, Intermediate and Reservoir
4. Study of life cycle and pathogenicity for following human parasites;
 - i. *Plasmodium vivax*
 - ii. *Faciola hepatica* (Liver fluke)

UNIT IV: Genetics

(15 Marks)

1. Sex linked inheritance
 - a. Eye colour in drosophila
 - b. Colorblindness in humans
 - c. Hemophilia in humans
2. Crossing over: Mechanism of crossing over
3. Linkage : Linkage in drosophila



Reference Books:

Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut

Genetics by P. K. Gupta

The Structure of the Question Paper for the University exam

Semester IV (Zoology) Paper no: 405

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

Total Number of Question: 04

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



KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as CBCS System

Zoology Semester –IV (PRACTICALS)

CEZO 405: Animal Diversity, Parasitology and Genetics

Identification and classification upto order giving reasons (Practical 1-3)

Practical 1: Classification of Reptiles: Calotis, house lizard, gecko, Cobra, rat snake, Saw scaled viper, Chameleon, Crocodile, Tortoise, Turtle, Varanus, Mabuya, spiny tailed lizard

Practical 2: Classification of Aves: Pigeon, Sparrow, Kite, Vulture, Hoopoe, Green bee eater, Goose, Partridge, Crane, Kingfisher, Parakeet, Owl, Crow, Lapwing, Swift.

Practical 3: Classification of Mammals: Hedgehog, Flying fox, Human, Dog, Blue-whale, Blue bull, Elephant, Dugong, Squirrel, Indian hare, Pangolin

Practical 4: Study of external characters of Calotis

Practical 5: Study of Digestive system of Calotis

Practical 6: Study of Circulatory system of Calotis

Practical 7: Mounting (Pecten and Hyoid apparatus)

Practical 8: Study of human parasites: *Plasmodium vivax*, Liver fluke, Anopheles and culex mosquitoes, tape worm, mites, hair louse. (Short description, type of parasite/host and its parasitic effects for each)

Practical 9: To solve the problems of sex linked inheritance Eye color in drosophila

Practical 10: To solve the problems of sex linked inheritance Colorblindness in Human

Practical 11: To solve the problems of sex linked inheritance Hemophilia in Human

Local field excursion – Report submission

Journal Submission



Instructions:

- ***The Zoological excursion is compulsory to study the ecosystem, Animal behavior and their life style for the students.*** Excursion report is mandatory for all the students and marks will be calculated in practical examination
- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.

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

ZOOLOGY 405: Animal Diversity, Parasitology and Genetics

Date: _____

Total Marks: 30

Time: 4 hours

Q.1 Draw/Demonstrate & explain the _____ system of the given animal to examiner. 07

Q.2 Show how to prepare temporary mounting of _____ from calotis and show to examiner. 03

Q.3 Solve the given problem of sex linked inheritance 03

Q.3 Identify specimens 1 to 5 as per instructions: 10

1. Identify and classify giving reason
2. Identify and classify giving reason
3. Identify and describe
4. Identify and do as directed
5. Identify and do as directed

Q.4. Viva voice 02

Q. 5 Report /submission(local field excursion) 02

Q.5 Journal 03



KSKV Kachchh University, Bhuj - Kachchh
Zoology Syllabus as CBCS System
Zoology Semester –IV (THEORY)

CEZO-406: Animal adaptations, Zoogeography and Developmental biology

Unit I: Adaptations

Introduction to adaptation. Details of following adaptations with suitable examples

1. Arboreal Adaptation
2. Aquatic adaptation
3. Cursorial adaptation
4. Fossorial adaptation

Unit II: Animal behavior

1. Parental care – in general
 - a. Case studies Pisces, amphibians, reptiles and mammals
2. Adaptation of feet in Birds
3. Adaptation of beak in birds
4. Variation and Mimicry
5. Darwin theory of Natural selection

Unit III: Zoogeography

1. Introduction
2. Brief account of Zoogeographical realms with mammalian fauna
 - i. Australian Region
 - ii. Oriental Region
 - iii. Neotropical Region
 - iv. Ethiopian Region
 - v. Nearctic Region
 - vi. Palearctic Region

Unit IV: Developmental biology

1. Types of eggs (with examples) and cleavage
2. Fertilization and parthenogenesis
3. Blastulation and Gastrulation
4. Three germ layers
5. Organogenesis

Reference books:

Modern Text book of Vertebrates by R. L. Kotpal
Genetics by P. K. Gupta
A Manual of Zoology Vol. I & II by Ekambernath Ayar



The Structure of the Question Paper for the University exam

Semester IV (Zoology) Paper no: CEZO 406

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

Total Number of Question: 04

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



KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as CBCS System

Zoology Semester –IV

(PRACTICAL)

CEZO-406: Animal adaptations, Zoogeography and Developmental biology

Practical 1: Study of Arboreal adaptations with suitable examples

Practical 2: Study of Aquatic adaptations with suitable examples

Practical 3: Study of Cursorial adaptations with suitable examples

Practical 4: Study of Fossorial adaptations with suitable examples

Practical 5: Study Parental care in different animals with suitable examples

Practical 6: Study of various types of feet in birds

Practical 7: Study of various types of beaks in birds

Practical 8: Marking various zoogeographic zones on the map. (*Using world map*)

Practical 9: Zoogeographic distribution of mammalian fauna on map. (*Using world map*)

Practical 10: To study the embryonic developments of i). Egg type ii). Cleavage iii). Blastulation and Gastrulation (*Using permanent slides and/or charts*)

Local field visits to study animal adaptations and behavior.

Journal submission

Instructions:

- *The Zoological excursion is compulsory to study the ecosystem, Animal behavior and their life style for the students.*
- *Excursion report is mandatory for all the students and marks will be calculated in practical examination*
- *This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination.*



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

ZOOLOGY 406: Animal adaptations, Zoogeography and Developmental biology

Date: _____

Total Marks: 30

Time: 4 hours

- | | |
|---|----|
| Q.1 Mark the given Zoogeographic zones on the given world map. | 05 |
| Q.2. Mark the Zoogeographic animal distribution on the given world map. | 04 |
| Q.3. Identify specimens 1 to 6 as per instructions: | 12 |
| <div style="margin-left: 40px;"><ol style="list-style-type: none">1. Identify animal and write about its adaptation2. Identify animal and write about its adaptation3. Identify animal and write about its parental care4. Do as directed - type of feet5. Do as directed – type of beak6. Do as directed – Egg type/cleavage/ gastrulation/blastulation</div> | |
| Q.4. Viva voice | 03 |
| Q. 5 Report /submission | 03 |
| Q.6 Journal | 03 |



Krantiguru Shyamji Krishna Verma

Kachchh University

Mundra Road

Bhuj – 370001

Effective from June 2016

SYLLABUS

B.Sc Semester V: (Five)

ZOOLOGY

Three papers:

Semester – V (Three papers)
CEZO CEZO -507: General Chordata and Comparative Anatomy
CEZO -508: Ecology, Evolution and Genetics
CEZO -509: Biochemistry and basic Biophysics

KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as CBCS System

Semester -V

Paper 507 (Theory)

CEZO -507: General Chordata and Comparative Anatomy

Total Marks: 60

UNIT I: Animal diversity (Chordata)

(15 Marks)

1. Cephalochordate: Type: - Amphioxus

i. Salient features of Cephalochordate, ii. Systemic position iii. External character

2. Urochordata: i. Salient features of Urochordata ii. Systemic position

3. Cyclostomata: i. General characteristics ii. Systemic position

UNIT II: Type study – Chordata (through charts/ models/ multimedia)

(15 Marks)

1. Pigeon (*Columba livia*) - Classification, Habit & Habitat,

- External characters,
- Digestive system,
- Respiratory system & Air sacs,
- Brain
- Reproductive systems ,

UNIT III: General Topics

(15 Marks)

1. Aves: As a successful flying machine – flight adaptations (morphological and physiological)
2. Aves: Structure of feathers, Types of feathers, Uses of feathers,
3. Migration: Reasons of migration, theories of migration, migration in birds and other vertebrates.
4. Adaptation of Marine mammals (Deep diving, swimming adaptation, thermoregulation, water conservation and sensory adaptations).

UNIT IV: Comparative anatomy

(15 Marks)

Comparative anatomy of Heart
Comparative anatomy of Brain
Comparative anatomy of kidney

Reference Books:

Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut

Chordata Zoology by E. L. Jordan and P. S. Verma

Integrated Principles of Zoology by Hickman

Cytology by P. K. Gupta, S. Chand & Company, Delhi

Jiv-Vigyan by Nirav Prakashan

Structure of the Question Paper for University exam

Semester V (Zoology) Paper No.

CEZO– 507: General Chordata and Comparative Anatomy

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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh
Zoology Semester V

Paper No.CEZO– 507: General Chordata and Comparative Anatomy

(PRACTICALS)

Identification and classification upto order giving reasons (Practical 1-2)

Practical 2: Study of Phylum Cephalochordata (Amphioxus)

Practical 2: Study of Phylum Urochordata (Ascidia, Salpa, Doliolum, Pyrosoma, Oikopleura)

Practical 4: Study of phylum Cyclostomata (Lamprey, Hagfish)

Practical 3: Type study (Chordata). Study of Pigeon (*Columba livia*) (**Using charts/multimedia/models**)

3.1 Study of external characteristics of Pigeon

3.2 Study of digestive system of Pigeon

3.3 Study of respiratory system of Pigeon

3.4 Study of Nervous system of Pigeon

3.5 Study of Reproductive system of Pigeon

Practical 4: Study of structure and types of feathers in birds (through charts/slide preparation)

Practical 6: Study of Marine mammals: Whale, dolphin, dugong (Through charts and specimens)

Practical 7: To study Comparative anatomy of Heart

Practical 8: To study comparative anatomy of Brain

Practical 9: To study comparative anatomy of Kidney

Journal submission

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

ZOOLOGY (507): General Chordata and Comparative Anatomy

Date: _____

Total Marks: 30

Time: 4 hours

Q.1 Draw/Demonstrate & explain the _____ system of the given animal to examiner. **06**

Q.2 Describe the structure and type of given feather. **03**

Q.3 Identify specimens 1 to 6 as per instructions: **12**

1. Identify and classify giving reason
2. Identify and classify giving reason
3. Identify and describe
4. Identify and do as directed (Marine mammal)
5. Identify and do as directed (Comparative anatomy)
6. Identify and do as directed (Comparative anatomy)

Q.4. Viva voice **03**

Q. 5 Submission **03**

Q.5 Journal **03**

KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as CBCS System

Semester -V

Paper 508 (Theory)

CEZO -508: Ecology, Evolution and Genetics

Total Marks: 60

UNIT I: Ecology

Marine Ecosystem in detail: Animals of intertidal area, challenges to intertidal fauna, Deep sea environment and adaptations, hydrothermal vents

Mangrove Ecosystem, its ecological role, status of mangroves in India and Gujarat

UNIT II: Evolution

Variation: Types of variation, Causes of variation

Isolation: Mechanism of isolation, Types of isolation, Geographical isolation, Reproductive isolation, Pre zygotic isolation, Post zygotic isolation, Origin of isolation.

Speciation: Definition, Allopatric, Peripatric, parapatric, sympatric

Role of Mutation in speciation

UNIT III: General Topics

(15 Marks)

Origin of Tetrapoda: in general

Origin of Amphibia

Origin of Reptiles

Dinosaurs: General description, Hypothesis/probable theories of extinction

UNIT IV: Genetics

(15 Marks)

Chromosome Structure, types of chromosomes (based on centromere),

Chromosomal aberrations.

Mutation: Causes, Types of mutations

Gene mutations

Karyotyping of Human chromosomes, Twins

Reference Books:

Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut

Chordata Zoology by E. L. Jordan and P. S. Verma

Integrated Principles of Zoology by Hickman

Cytology by P. K. Gupta, S. Chand & Company, Delhi

Jiv-Vigyan by Nirav Prakashan

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

Structure of the Question Paper for University exam

Semester V (Zoology) Paper No.

CEZO– 508: Ecology, Evolution and Genetics

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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh
Zoology Semester V

Paper No.CEZO– 508: Ecology, Evolution and Genetics

(PRACTICALS)

Practical 1: Study of Marine ecosystem

Practical 2: Plotting of Mangrove distribution on Maps (Gujarat and India)

Practical 3: Study of selected intertidal animals and their characters (Fiddler crab, Trocus, Neries, Sabella, Hermit crab, barnacles, sea anemone)

Practical 4: Study of different types of marine turtle.

Practical 5: Study of some important fauna of Kachchh. (GIB, Spiny tailed lizard, Wolf, Flamingoes, ..any other relevant may be added).

Practical 6: Study of Variations using said experiment/example

Practical 7: Study of various dinosaurs. (Brontosaurus, Triceratops, Tyranosaurus, Dimetrodon, Stegosaurus, Pteranodon, Ichthyosaurus, Iguanodon). Using photographs or models.

Practical 8: Preparation of human Karyotyping.

Practical 9: Studying types of mutation using diagrams (chromosomes and mutation diagrams).

Field Visit report

Journal submission

KSKV Kachchh University, Bhuj - Kachchh

Zoology Syllabus as per CBCS System

Semester -V

Paper 509 (Theory)

CEZO -509: Biochemistry and basic Biophysics

Total Marks: 60

UNIT I: Carbohydrates

(15 Marks)

- Introduction, classification of carbohydrates, asymmetry
- Monosaccharides: Definition and general formula, classification upto hexoses (with structure of appropriate examples).
- Disaccharides: Definition, Classification based on glycosidic linkage, general description on Maltose, Lactose and Sucrose.
- Polysaccharides: Definition, Classification (Only flow chart), General properties of Starch, Glycogen, Cellulose, Chitin and Hyaluronic acid.
- Biological importance of carbohydrates

UNIT II: Proteins

(15 Marks)

- Classification of Proteins :
 - o Based upon shape - Globular and Fibrillar
 - o Based upon composition & solubility - Simple, Conjugated and Derived
- Biological importance of proteins
- Amino acids – In general

UNIT III: Lipids and Enzymes

- Lipids: Types of lipids,
- Classification of Lipids (Simple, compound and derived), Properties of lipids
- Biological importance of lipids
- Enzymes – Definition, Types of enzymes, Properties of enzymes
- Factors affecting enzyme activity/enzyme catalyzed reaction :
 - Temperature, b) pH, c) Inhibitors, d) Enzyme concentration, e) Substrate concentration

UNIT IV: Biophysics and instrumentation

(15 Marks)

- Basic structure ,working principals, function and application
 - Scanning Electron Microscope, Electron Microscope, Spectrophotometer, Ovens
 - AAS (Atomic Absorption Spectrophotometer), Micro pipette, Centrifuge.

Reference Books:

1. **Elementary Biochemistry**, J. L. Jain, S. Chand & Company, Delhi.
2. **Harper's Biochemistry**, Lange, McGraw-Hill.
3. **Principles of Biochemistry**, Lehninger, CBS Publications.
4. **Cytology**, P. S. Verma & V. K. Agarwal, S. Chand & Company, Delhi.
5. **Cellular and Molecular Biology**, De Robertis and De Robertis, Saunders Pub.

Structure of the Question Paper for University exam

Semester V (Zoology) Paper No.

CEZO– 509: Biochemistry and basic Biophysics

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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh

Zoology Semester V

Paper No.CEZO– 509: Biochemistry and basic Biophysics

(PRACTICALS)

Practical 1: Detection of Carbohydrates: Monosaccharides – Glucose and Fructose
- Disaccharides - Lactose, Maltose and Sucrose

Practical 2: Detection of Proteins – Albumin and Casein

Practical 3: Preparation of atomic models of Carbohydrates. (as done in practical)

Practical 4: Preparation of atomic models of Proteins. (as done in practical)

Practical 5: Preparation of various graph for effect of temperature on enzymatic action.

Practical 6: Preparation of various graph for effect of pH on enzymatic action.

Practical 7: Preparation of various graph for effect of enzyme and substrate concentration on enzymatic action.

Practical 8: Study of various instruments/ Tools and techniques.

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

ZOOLOGY (509): Biochemistry and basic Biophysics

Date: _____ **Total Marks: 30** **Time:**

- Q.1 Detect any two constituents from the given unknown solution and show your tests to the examiner. 07
- Q.2 Prepare the atomic model of _____ and show it to the examiner. 05
- Q.3. Preparation of _____ graph for enzymatic reaction. 03
- Q.3 Identify specimens 1 to 6 as per instructions: 09
1. Identify and give its application/use– (Instrument)
 2. Identify and write working principle – (Instrument)
 3. Identify the substance based on the given structure
- Q.4. Viva voice 03
- Q.5 Journal 03

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)
CEZO -610: Non chordate, Pollution, Population dynamics and Immunology
CEZO -611: Economic Zoology and Biotechnology
CEZO -612: Endocrinology, Physiology and Ethology

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

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: Quadrature, 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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh

Zoology Semester VI

Paper No.CEZO-610

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

(PRACTICAL)

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:

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

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)

- The examination pattern of the university is 60% external and 40% internal
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh
Zoology Semester VI
Paper No.CEZO-611
CEZO -611: Economic Zoology and Biotechnology

(PRACTICAL)

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:

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

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

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
- Types of question for section 'A' may include: one to two line question/ definition/ drawing small figures/ filling the blanks/ multiple choice question/ match the pairs etc.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- Minimum length of the submission is printed five A4 size pages.

KSKV Kachchh University, Bhuj - Kachchh
Zoology Semester VI
Paper No.CEZO-612
CEZO -612: Endocrinology, Physiology and Ethology
(PRACTICAL)

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:

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