VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

SYLLABUS

Department of Studies in Zoology

BACHELOR OF SCIENCE

(I to VI Semester)

With effect from 2016-17

BACHELOR OF SCIENCE IN ZOOLOGY

COURSE OF VSK UNIVERSITY

DRAFTED ZOOLOGY SYLLABUS

SEMESTER	PAPER NO/TITLE	Teaching Hrs/ Per week	Theory Examination Marks	Internal Assessment Marks	Practicals / Per Week	Practical Examination Marks	Practical I.A. Marks
FIRST	Z:1 Biology of non-chordates	4	70	30	2 X 3 = 6	40	10
SECOND	Z:2 Biology of chordates & comparative anatomy	4	70	30	2 X 3 = 6	40	10
THIRD	Z:3 Economic Zoology and Histology	4	70	30	2 X 3 = 6	40	10
FOURTH	Z:4 Physiology & Bio-chemistry	4	70	30	2 X 3 = 6	40	10
FIFTH	Z:5.1 Cell Biology and Developmental biology	3	70	30	1 X 3 = 3	40	10
	Z:5.2 Environmental 3 biology and Wild-life zoology	3	70	30	1 X 3 = 3	40	10
SIXTH	Z:6.1 Genetics & Biotechnology	3	70	30	1 X 3 = 3	40	10
	Z:6.2 Ethology&, Evolution	3	70	30	1 X 3 = 3	40	10

FIRST SEMESTER THEORY

Z.l. Biology of Non-chordates **64 Hrs**

Code :Z-1 Univ Code :
Contact Hours : 64 Work load : 4 hours per week
Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

1. **Introduction to classification organisms** 3 Hrs
   - Bio-systematics (Taxonomy): Linnanean Hierarchy (phylum,class,order,family,genus,species)
   - Types of classification (phylogenetic,Artificial,Natural)
   - Bionomial nomenclature.

2. Phylum Protozoa 8 Hrs
   - General characters,classification upto classes with examples
   - Type study: Life cycle of malarial parasite
   - Locomotion in Amoeba
   - Reproduction in protozoa.

3. Phylum porifera 4 Hrs
   - General characters,classification with examples
   - ♦ Canal system,histology of sponges,skeletal elements

4. Phylum coelenterate 6 Hrs
   - General characters,classification with examples
   - Polymorphism in Hydrozoa
   - Life cycle & morphology of Obelia
   - Corals,types& significances

5. Phylum Platyhelminthes 5 Hrs
   - General characters,classification with examples
   - Morphology and Life cycle of Taenia solium
   - Parasitic adaptations

6. Phylum : Aschelminthes 2 Hrs
   - General characters
   - Key characters of Ascaris & Wucheraria bancrofti

7. Phylum : Annelida 4 Hrs
   - General characters & classification upto classes with examples. Concept of vermiculture.

8. Phylum : Arthropoda 8 Hrs
   - General characters & classification upto classes with examples
   - Prawn : Type study : Appendages,digestive system & Nervous system, reproductive system.

9. Phylum: Mollusca 5 Hrs
   - General chacracters & classification upto classes with examples
   - Type study Pila globosa

10. Phylum: Echinodermata 5 Hrs
   - General characters & classification upto classes with example
   - Water vascular system in star fish
   - Larval forms and their significance

PRACTICAL ZP-1
BASED ON SEMESTER-1 PAPER 2-1: BIOLOGY OF NONCHORDATA

A. MUSEUM SPECIMENS AND SLIDES:
Commonly available specimens cited in the list of examples for theory are to be selected.

1.	Protozoa	:	Rhizopoda: any two examples , Mastigophora: any two examples Ciliata: : any two examples Opalinata: Opalina Sporozoa: any two examples.
2.	Porifera	:	Calcaria:. Sycon, etc., Hexactinellida:. Hyalonema etc., Demospongia:. Euspongia, spongella
3.	Coelenterata	:	Hydrozoa: . Hydra, Obelia Scyphozoa: Aurelia Anthozoa:. Corals, Meandrina, Astrea
4.	Platyhelminthes	:	Turbellaria: Planaria. Trematoda:. Liver Fluke, Blood Fluke, Cestoda:.Taenia Solium, Echinoecoccus.
5.	Aschelminthes/ Nemathelminthes	:	Round Worms, Ascaria, Wuecharia Dracuncula medinensis,
6.	Annelida	:	Polychaeta: . Neries, Heteroneries Oligochaeta:. Earthworm,chaetopterus Hirudinea:. Leech
7.	Arthropoda	:	Onychophora:.Peripatus, Crustacea:. Crab, Prawn Insecta: Butterflies, Beetles, Termites, Grosshoppers, etc., , Arachnida: Spiders , Scrorpion,limulus Myriapoda: Scolapendra,and Julus
8.	Mollusca	:	Polyplacophora: Chiton Scaphopoda:.Dentalium Gastropoda: Pila, Pelecypoda: Unio, Oyster, Octopoda: Octopus, Sepia, Nautilus.
9.	Echinodermata	:	Asteroidea: Starfish, Ophiuroidea:Brittle star Echinoidea: Echinus Holothuroidea: Sea Cucumber Crinoidea: Sea lily.

B. DISSECTIONS:

1. Earthworm : **Digestive system, Nervous system. Mounting in Earthworm: Setae, Spermatheca**
   Or

			Leech; Digestive system, Reproductive system Mounting in Leech; Jaws, Nephridia,
2.	**Cockroach**	:	**Digestive system, Nervous system, Mounting in cockroach: Mouth parts**
			Or
	Prawn	:	**Digestive system, Nervous system. Mounting in Prawn: Appendages**

FORMAT OF QUESTION PAPER FOR
PRACTICAL Z-P.1 :
BIOLOGY OF NONCHORDATA

Maximum Marks : 40

Q.1	Museum specimens and slides	:	10 x 2 = 20
Q.2	Dissection	:	10
Q.3	Mounting	:	05
Q.4	Record Book	:	05

SECOND SEMESTER THEORY

Z. 2.Chordate Biology and Comparative Anatomy 64 Hrs

Code : **Z-2** Univ Code :
Contact Hours :64 Work load : 4 hours per week
Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

1. General characters & organization of chordate & brief classification up to class. 2 Hrs
2. Protochordata 5 Hrs
   - i. Features of Hemichordata
   - ii. Features of Urochordata
   - iii. Features of Cephalochordata
   - iv. Retrogressive metamorphosis and significance in Ascidia.

2.1 General characters of cyclostomes.

3. Class : Fishes 9 Hrs
   - General characters and classification upto subclasses (Osteichthyes) with examples
   - Type study-Scoliodon; morphology, circulatory system, digestive system & urinogenital system.
   - Scales in fishes & migration of fishes
   - A brief note (characters & distribution) on lung fishes.

4. Class : Amphibia 8 Hrs
   General characters & classification upto orders with examples
   - Type study of frog : vertebral column (division of vertebral column , atlas ,typical 8^{th} ,9^{th} & 10^{th})
   - Appedicular skeleton : Girdles & limbs

5. Class: Reptilia 6 Hrs
   - General characters & classification upto order(living orders) with examples
   - Identification of poisonous & non poisonous snakes

6. Class : Aves 9 Hrs
   - General characters with classification upto orders mentioned
   - Archaeornithes

   Neornithes

   a. Paleognathae (struthifromes, casauriformes,apterygiformes)
   b. Neo-gnathae (falconiformes,columbiformes,cuculiformes, Psittaciformes,strigiformes,coraciformes, Passeriformes)

   - Flight adaptation
   - Migration : definition, kinds of migration.

7. Class : Mammalia 9 Hrs
   - General characters with classification upto subclasses (protheria, theria- metatheria & eutheria) with examples
   - **Orders**:Insectivora,chiroptera,primates,foliodata,rodentia, cetacea ,carnivora, perissidactyla,arteodactyla,proboscida)
   - Detailed study of Rat : Morphology & anatomy(excluding skeletal system)

II.	Comparative anatomy	13	Hrs
	♦ General structure of integument & its functions	2	Hrs
	♦ Comparison of the digestive systems of scoliodon, frog, calotes, pigeon & rabbit		
	♦ Comparison of Heart & aortic arches in chordates (scoliodon, frog, calotes, pigeon & rabbit)	6	Hrs
	♦ Comparison of Brain of chordates	5	Hrs

PRACTICAL ZP-2
BASED ON PAPER Z-2:
BIOLOGY OF CHORDATA AND COMPARATIVE ANATOMY

.1	Protochordata	:	Hemichordata : Balanoglasus Urochordata : Ascidian Cephalochordata : Amphioxus
2.	Cyclostomata	:	Petromyzon/ Myxine
3.	Pisces	:	Chondricthyes:Shark, Torpedo, Sphyrna, Pristis, Osteichthyes : Mystis, Labeo, Rohita, Cat fishes,(Corps and cat fishes)
4.	Amphibians	:	Anura: Frog,Hyla, Rhacoporous, Urodela: Salamander, Newten, Axolotl, Apoda:Ichthyophis
5.	Reptilia:	:	Lacertilia: Gecko, Calotes, Wall lizard, **Ophidia:Cobra, Rat snake, Viper etc.,** **Chelonia: Turtle, Testudo, Chelonia,** **Crocodilia: Corodile, Alligator**
6.	Aves	:	Archeornithes: Archaopteryx Neornithes:Grey Heron, Pond Heron, Little erget, Siberian Crane, Common Crow, Pigeon, Owl, King Fisher, Jacana, wood Pecker
7.	Mammalia	:	**Prothetia : Echidna,Platipus** **Metatheria :Kangaroo** **Theria : Squirrel, Rabbit, Bat,Loris, Monkey,**
			Study of scales in fishes
8.	**COMPARATIVE ANATOMY**		

Demonstration/ charts of digestive system of fish to mammals
Demonstration /charts of heart, aortic arches of fish to mammals.
Demonstration /charts of Brain of fish - mammals
Study of skeletal system of frog as per theory syllabus.

FIELD ORIENTED ACTIVITIES:

1. Visit to nearby garden/ forest land/crop land/grass land/river/stream/sea/sanctuaries/national park to study the animal diversity.

2. Bird watching and preparation of checklist of birds of college campus.

3. Collect of local edible fishes.

FORMAT OF QUESTION PAPER
FOR PRACTICAL ZP.2:
BIOLOGY OF CHORDATA AND COMPARATIVE

Maximum Marks : 40

Q.1	Museum specimens	:	10x 2 = 20
Q.4	Comparative anatomy	:	5x2=10
Q.5	Project work	:	5
Q.6	Record Book	:	5

OEC

II semester **40 hrs**

Syllabus

Unit-1: **07 hrs**

- Introduction to zoology, branches and scope of zoology.
- Biosystematics (taxonomy)-Linnaenean Hierarchy (phylum, class, order, family, genus and species**)**
- Types of classification (Phylogenetic, artificial and natural)
- Binomial nomenclature- Ex Homo sapiens and cocos nucifera.

Unit -2: **15 hrs**

- Sericulture:- History, Agro based industry, Research Institutes of sericulture in India.
- Moriculture- Different species of mulberry, cultivation methods.
- Morphology of silkworm and silk moth.
- Silkworm rearing methods- Chawki rearing and adult rearing.
- Life cycle of Silk moth.
- Types of silkworms- Mulberry and non-mulberry silkworms.

Unit -3: **15 hrs**

- Silk worm diseases – Pebrine ,muscardine ,flacherrie and grasserie.
- Types of silk: Mulberry and non-mulberry silk(Eri silk, muga silk and Tasar silk).
- Significance of sericulture and its by products.

Unit -4: **03 hrs**

- Vermiculture: Introduction, definition, Vermicompost.
- Significance of vermiculture.

REFERENCES

1.A hand book of Economic Zoology- S.Chand
2.Vermiculture and organic farming- Sathe .T.V – Daya Publishing house,New Delhi.
3.Hand book of Practical sericulture-Ullal.S.R and Narasimhan.M.N Central Silk Board, Bangalore.
4.Hand Book of silkworm rearing agriculture and Technical manual-1. Fuzi Publn.com
5.Earthworm Ecology- Lee.
6.Biology of Earthworm- Stevenson.
7.Vermicomposting technology soil health to human health- Ranganathan.L.S.

THIRD SEMESTER THEORY

Z .3 ECONOMIC ZOOLOGY & HISTOLOGY

Code : **Z-3** Univ Code :
Contact Hours :64 Work load : 4 hours per week
Credit Points :
Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

A. POULTRY -10hrs.

Aim and scope of poultry; poultry farm management; poultry breeds in India; rearing of house equipments ;poultry feed & its composition; broiler& layers ;rearing ; nutritive value of egg and meat; a note on diseases-viral,bacteria, protozoan , helminthes ,genetic,ecto-parasites, nutritional deficiency diseases of poultry birds, symptoms, remedies and their control.

B.DAIRY FARMING -8hrs.

Importance ; Scope and management of farm animals ; breeds of cows and buffaloes ; nutrition requirements; housing and hygiene of dairy animals; milk and milk byproducts; processing, preservation and marketing of milk; breeding techniques; artificial insemination; breeding programs to improve local breeds.

C.SERICULTURE – AGROBASED INDUSTRY **-1**0hrs. Components of sericulture : Moriculture – different species of mulberry; cultivation methods ;silkworm rearing; life cycle & morphology of Bombyx mori; environmental conditions needed for rearing; modern rearing house; rearing equipments; chawki worm & adult worm rearing methods; non mulberry silkworms; pest & predators; a note on silkworm diseases – Pebrine, musacardine,Flacherie & Glacherie. Types of silk ,importance of sericulture & byproducts of sericulture.

D. AQUACULTURE- 10hrs.

Principle ; scope; techniques and importance of culturing, economically important aquatic organism; brief account of culturing of Indian major exotics corps & fresh water prawn ;induced breeding of major carps and seed fish, pearl-culture (brief note) composite fish culture (polyculture)

E.APICULTURE **-7hrs** Honeybee morphology; structural adaptations of mouth parts, honey sac; wax glands and sting apparatus ; social life ; different species and races,management of bee keeping(modern methods) **;** economic importance of honey, wax, pollen Venom & bee pollination; a note on production of honey ; its chemical composition & honeybee disease.

REFERENCES

1. Jhingran V . G . Fish and fisheries of India. Hindustan Publishing corporation, New Delhi.
2. Kovaleve,P.A,Silkworm breeding stocks, central silk board, marine drive. Bombay .
3. Roger ,A.Morse. The ABC and XYZ of bee culture. A.I. Root and Medina. Ohio 44256.
4. Harbnas Singh and Earl.N. Moore, Livestock and poultry production.
Prentice Hall of India, New Delhi.
5. Milk Dick, Aquarium Fish, D. K. Publishing book, New York 10016.
6. Bal, D.V & K.V. Rao, marine fisheries Tata McGraw Hill
publishing co.Ltd.
New Delhi -110 051.

Histology -12hrs

Study of Histological structure and functions of following Mammalian organs.

- Tongue (C.S.) with reference to mucosa papillae and taste bud
- Alimentary canal: Basic histological organization with reference to: Stomach(T.S), small intestine(T.S).
- Glands associated with digestive system: Liver(C.S) and Pancreas (C.S) including both exocrine and endocrine component.
- Kidney : structure of nephron T.S of kidney passing trough cortex and medula
- Reproductive organs : A) Testis (T.S) with reference to seminiferous tubules and cell of leydig. B)Ovary (C.S) –primary, secondary and matured (Graffian) follicle corpus luteum and corpus albicans.

Histology of endocrine glands : 1)Pituitary. 2) Thyroid.
3) Adrenal.

Reference books

1. Bailey Text book of Histology , 1971, 16th edn. Wilfred M.Copenhaver Richard P. Bung & Mary bartell Bunge, The William & wilkings company Baltimore.

2. Histology 979 ,8th edn. Arthur W.Ham. David H . Cormark. J.B.Lippincot. Co. Philadephia.

PRACTICAL BASED ON PAPER Z-3:

III: ECONOMIC ZOOLOGY

1. Food fishes: Catla, Miglala, Anabas, Mackeral, Sardine, Mugil, Rohu, Channa, Shark.
2. Study of mouth parts and sting apparatus of honey bee, nature and use of bee hive, bee wax and honey bee plants.
3. Life cycle of bombyx mori including externals, mulberry and non-mulberry, cocoons.
4. Byproducts' of fisheries, poultry dairy and sericulture-fish oil, milk powder, egg powder, fowl excreta, dry cocoons and silkworm and excreta.
5. Study of poultry breeds (indigenous and exotic-two example for each)
   a) Broilers – 2.
   b) Layers – 2.
6. Study of mulching breeds (indigenous and exotic-two example for each)
7. Study of MOET – Explanation with chart, (IVF & ET charts).
8. Study of Pearls.
9. Visit to Poultry farm.
10. Visit to Dairy farm.
11. Visit to Veterinary Hospital.
12. Visit to Silk Rearing Centre.
13. Visit to Aquaculture Farm.

NOTE: A brief report of any two above mentioned farms and study tour is COMPULSORY.

PRACTICAL-ZP.3
BASED ON PAPER Z-3

Economic zoology and Histology

1.Foodfishes:Catla,Miglala,Anabas,Mackerel,Sardine,Mugil,Rohu,Channa, Shark,.
2. Study of mouth parts and sting apparatus of honey bee,nature and use of bee hive, bee wax and honey.
3. Life cycle of bombyx mori including externals,Mulberry and non-mulberry,Cocoons.
4. Biproducts of fisheries,poultry dairy and sericulture - fish oil, milk powder, egg powder, fowl excreta,dry cocoons and silkworm and excreta.
5. Study of poultry breeds(Indigenous and Exotic - two examples for each)
   a) Broilers - 2, b) Layers - 2.
6. Study of Milching breeds (Indigenous and Exotic - two examples each)
7. Study of MOET - Explanation with chart (IVF & ET charts)
8. Study of Pearls.
9. Visit to poultry farm.
10. Visit to dairy farm.
11. Visit to veterinary hospital.
12, Visit to silk rearing centre.

13. Visit to aquaculture farm.
NOTE: A brief report of any two above mentioned farms and study tour is COMPULSORY.

Histology
1.Procedure for the preparation of staining of paraffin section.
2.Study of cross sections of organs included in theory from permanent slides

The following Breeds are recommended for Theory & Lab study
1.PSCICULTURE
A.Carps :Catla,Labeo,Cirrihinus,Labeo Calbasu
B.cat fishes:Wallago Atta,Mystus Seenghala,Clarsius Betrachus,Heteropneustes Fossilis.
2.DIARY
Sahiwal,Redsindi,GIR,Deoni – MILCH BREEDS
B.Draught breeds
Hallikeri,Amruthmahal
C.General utility breeds
Hariana,Ongole
EXOTIC BREEDS
Holstein-Friesion,Jersey,Brown-swiss,Ayrshire
Poultry – Indigenous
Aseel,Chittagong,Gallusgallus,Red jungle fowl
Exotic Breeds
Giriraj,Leghorn,Rhode-Islandred,Rhode-IslandWhite,
Plymouth-rock,Newhampshire

FORMAT OF QUESTION PAPER FOR PRACTICAL:ZP-3
ECONOMIC ZOOLOGY AND HISTOLOGY

Max marks=40

Time - 3hrs

Q1. Identification and comment on A B & C
(Poultry,fisheries and dairy) 3X3=09
Q2.Identification and comment on different products of (poultry,fisheries,sericulture and dairy apiculture) 5X2=10
Q3. Identification of mouth parts / sting of Honey bee 3X1=03
Q4. Staining & identification of given paraffin section with labeled diagram

Q5. Histology-identification
1.Identify & describe
2. Identify & describe
3. Identify & sketch &label 3X2=06

Q6. Record Book 05

3 semester Theory Question paper format VSKU
Title of the paper :-ECONOMIC ZOOLOGY & HISTOLOGY

3 hrs Section A Max marks:80

Q1.Answer any 5 of the following 5X2=10
question no (1-7)
[four questions from Economic zoology and 3 questions from histology]

Section B
Q2 A) Answer any five of the following 5*5=25
question no(8-13)
(6 question s from Economic zoology)
B)Answer any one of the following 1*5=5
question no(14,15)
(2 questions from Histology)
Section C
Q 3 A)Answer any 3 of the following 3X10=30
question no(16-19)
(4 questions from Econoic zoology)

B)Answer any one of the following 1X10=10
question no(20,21)
(2 questions from Histology)

OPEN ELECTIVE SUBJECTS FOR ZOOLOGY, V.S.K UNIVERSITY, BALLARI

III semester **40 hrs**

Syllabus

Unit-1: **10 hrs**

- Introduction to host and parasitic relationship.
- Host- Intermediate host and definitive host.
- Parasite – Types of parasites.
- Animal association:- Commensalism, symbiosis, parasitism.

Unit -2: **10 hrs**

- Diseases and vectors.
- Historical perspective of diseases.
- Common diseases in human beings – Causes, mode of transmission, symptoms, effects and preventive measures of the following diseases.
  Typhoid, Malaria, Amoebiasis, Elephantisis, Dengue, Chicken gunya,and Hyper acidity.

Unit -3: **10 hrs**

- Sexually Transmitted Diseases (STD's)- Causes, mode of transmission, symptoms, effects and preventive measures of the following.
  AIDS/HIV, Gonorrhoea and syphilis.

Unit -4: **10 hrs**

- Importance of Education in preventing diseases.
- Awareness of diseases and maintainance of personal hygine.
- Community participation.

REFERENCES

1.Human physiology – Sherwood Klandrof, Yanc, Thompson Brooks/coole.2005.
2.Animal parasitology – Smyth.J.P Cambridge University press 1986.
3.General parasitology – Thomos.C Chung – Hardcourt Brace and Co.Ltd. Asia, New Delhi.

FOURTH SEMESTER THEORY

Z.4. PHYSIOLOGY AND BIOCHEMISTRY **64 hours**

Code : **Z-4** Univ Code :
Contact Hours :64 Work load : 4 hours per week
Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

1. Physiology of Digestion — 6 hrs

- Definition of digestion and types of digestion - mechanical and chemical.
- Digestion of carbohydrates, proteins and lipids.
- Absorption and assimilation of digested food materials.
- Gastrointestinal hormones.

2. Physiology of respiration -6hrs

- Types of Respiration - external and internal respiration.
- Structure of mammalian lungs and gaseous exchange.
- Transport of O_2 - formation of oxyhaemoglobin and affinity of haemoglobin for oxygen dissociation curves.
- Transport of CO_2 -Chloride shift, Bohr effect.

3. Physiology of Circulation -6hrs

- Open and closed circulation.
- Structure of mammalian heart and its working mechanism-Heartbeat and cardiac cycle. Myogenic and neurogenic hearts.
- Origin and conduction of heartbeat.

4. Physiology of Excretion -6 hrs

- Definition of excretion.
- Forms of nitrogenous waste materials and their formation; classification of animals on the basis of excretory products.
- Structure of Nephron and physiology of urine formation.

5. Physiology of Muscle contraction 6 Hrs

- General structure and types of muscles.
- Ultra structure of skeletal muscle. Muscle proteins.
- Sliding filament mechanism of muscle contraction.
- Chemical changes during muscle contraction- role of calcium, ATP utilization and its replenishment.

6. Physiology of Nerve impulse 6 Hrs

- Structure of nerve cell.(multipolar nerve cell)
- Nature of nerve impulse - definition, physiology and conduction of nerve impulse. Resting potential and action potential
- Properties of nerve impulse-threshold value, refractory period, all or none response.
- Conduction of nerve impulse along an axon-local circuit theory and salutatory conduction theory.
- Structure of synapse, mechanism of synaptic transmission-electrical and chemical transmission. Neurotransmitters.

7. Physiology of Endocrine system -6hrs

- Relationship between hypothalamus and pituitary gland.
- Hormones of Hypothalamus.
- Hormones of adenohypophysis and Neurohypophysis.
- Hormones of thyroid gland, parathyroid, adrenal and pancreas.
- Endocrine control of mammalian reproduction - Male and female hormones. Placenta

BIO -CHEMISTRY

1. Bio molecules : Concept of Micromolecules , macromolecules. 5 Hrs

- Introduction, classification and functions of Carbohydrates, proteins and lipids.

2. Enzymes: 5 Hrs

- Classification and properties
- Enzyme specificity
- Mechanism of Enzyme action (Lock & key)
- Factors affecting enzyme activity-enzyme concentration, substrate concentration, pH, temparature, activators and inhibitors of enzymes, holoenzyme, apoenzyme, prosthetic group, coenzyme, , co-factors, clinical significance of enzymes.

3. Vitamins 5 Hrs

- Introduction , study with reference to occurance, chemical nature, function and deficiency of vitamins. Classification of vitamins :Fat soluble vitamins - A,D,E,K; water soluble vitamins-B1,B2,B6,B12,nicotinic acid, folic acid, lipolic acid, biotin, pantothenic acid, ascorbic acid.

4 Bio-energetics-Glycolysis, Kreb's cycle and ETS 6 Hrs

Reference

1. Animal Physiology : P.S. Verma. & V.K. Agarwal
2. Animal Physiology : P.K. Saxena.
3. Animal Physiology : A.K. Berry.
4. Essentials of animal physiology : S.C. Rastogi.
5. Animal Physiology : Roger Eckert and David Randall.
6. Fundamentals of Bio chemistry : J.L. Jain,Sanjay jain, Nitin Jain.
7. Principles of Biochemistry: Lehninger, David L. Nelson, Michael M. Cox.

PRACTICAL - ZP - 4
BASED ON PAPER Z -4;
PHYSIOLOGY AND BIOCHEMISTRY

1. Qualitative tests for the detection of carbohydrates, (glucose - Biuret Test benedicts and fehlings tests
2. Starch- iodine), proteins (xanthoprotein) & fats (sudan-3) in the given sample
3. Qualitative tests for detection of nitrogenous excretory wastes in given sample
4. (For ammonia – (nesslers reagent). For uric acid – (folins reagent) (+ saturated sodium carbonate/ benedicts uric acid reagent)
5. Detection of abnormal excretion of sugar (gluclose) and albumin in human urine
6. Blood smear preparations , staining and study of human blood
7. Differential count (DC) of white blood corpuscles (WBCs) of human blood using the human blood smear slides
8. Total count (TC) of white blood corpuscles of human blood
9. Total count (TC) of red blood corpuscles of human blood
10. Estimation of hemoglobin content in human blood (Sahils method)
11. Preparation of hematin crystal from human blood
12. Determination of bleeding and clotting time of human blood
13. Salivary amylase activity test of human saliva
14. Osmotic haemolysis in animal cells (RBCs of blood of frog or human)
    [*blood samples - students should use individual disposable needles for drawing their own blood]

FOR FORMAT OF QUESTION PAPER

PRACTICAL- ZP - 4;

PHYSIOLOGY AND BIOCHEMISTRY

Q.1	Qualitative test for carbohydrates, proteins and fats.	05
Q.2	Detection of normal/ abnormal constitutes of urine.	05
Q.3	Preparation of blood smear slides and counts for DC/ TC of RB/WBC.	10
Q.4	Estimation of hemoglobin /preparation of hematin crystals in human blood.	05
Q.5	Project work	05
Q.6	Record book	05
Q.7	Viva voce	05

OPEN ELECTIVE SUBJECTS FOR ZOOLOGY, V.S.K UNIVERSITY, BALLARI

IV semester **40 hrs**

Syllabus

Unit-1: **10 hrs**

- Dairy farming: Scope and importance of dairy.
- Classification of breed – Mulching, draught and dual purpose breeds.
- Breeds of cows (indigenous and exotic breeds) and Buffaloes.

Unit -2: **10 hrs**

- Chemical composition and importance of milk.
- Byproducts of milk: - curd, ghee, butter, butter milk, cheese, khova, ice cream and yogurt.
- Breeding techniques :- IVF, ET, MOET and artificial insemination.

Unit -3: **10 hrs**

- Differences between indigeneous and exotic breeds of cattles.
- Importance of dairy.

Unit -4: **10 hrs**

- Processing , preservation and marketing of milk.

REFERENCES

1.Reproductionin farm animals – Hafez.E.S.E-(1962) Lea and Fibiger publisher.
2.Economic Zoology- Upadhyaya.
3.Economic Zoology-M.K.Publications.
4.Live stock and poultry production – Harbnas Singh and Earl.N.More- Prantice Hall of India.
5.

Fifth semester theory Z 5.1Cell biology and Developmental biology

CELL BIOLOGY

Code : **Z-5.1** Univ Code :
Contact Hours :54 Work load : 3 hours per week
Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

1. Introduction to cell biology : **-2hrs**

> Definition and scope
> Generalised prokaryotic and eukaryotic cell: Size, shape and structure.

2. Plasma membrane: **-3hrs**

^ Unit membrane concept.
> Fluid mosaic model
> Functions of plasma membrane

3. Endoplasmic reticulum: **-2hrs**

> Discovery, occurrence and morphology.
> Type : Smooth and Rough.
> Functions.

4. Golgi complex: **-2hrs**

> Occurrence and morphology
> Ultra structure and functions.

5. Lysosomes: **-2hrs**

> Occurrence and morphology
> Ultra structure and functions.

6. Mitochondria: **-2hrs**

> Origin ,occurrence and morphology
> Ultra structure and functions.

7. Nucleus: **-3hrs**

> Size , shape , number and position. Structure and functions of pore complex.
> Nucleolus: general organization and functions.

> 8. Cell cycle and cell division:
> Mitosis , meiosis and various phases of cell cycle.

-5 hrs

9. Cancer Biology:

> Definition and types of cancer
> Characteristics of cancer cell
> Carcinogen : Physical, Chemical and biological carcinogens.

References

1. Cell and molecular biology,1988, De Robertis EDP and De Robertis EME, Molt Saunders Inc.
2. Cell biology, 1986,C.B.Powar, Himalaya publication. House
3. Cell biology ,1986,Avers C.J. Addison Wesley Pub. Co. New York & London.
4. Cell and molecular biology ,1996, G. Carp John Waley,USA.
5. Cell biology, 1993, David E. Sadava Johnes and Bartlett publi. London.

Developmental Biology

1. Introduction -4hrs

> Branches and Scope of embryology.

> Gametogeneis , fertilization types and mechanism.

2. Cleavage -3 hrs

> Planes of cleavage - types of cleavage-holoblastic, meroblastic,radial and spiral types with examples. - Effect of yolk on cleavage.

3. Early development of frog -4 hrs

> Structure of ovum- Cleavage-Blastula-fate maps of Blastula-Gastrulation.

4. Early development of chick - 5 hrs

> Structure of hen's egg. Gastrulation -origin and structure of primitive streak.

> Study of structure of 18,24,48 hour chick embryos. (whole mount)

5. Extra embryonic membranes of chick -3hrs

> Development-structure and functions of yolk-sac, amnion, chorion and allantois.

6. Placenta -4hrs

> **Yolk sac placenta- Allantoic placenta-structure and functions of placenta.** Morphological and histological, classification of placenta with examples.

7. Modern trends in reproduction -IVF, Sperm bank, surrogate mother -3hrs

SYLLABUS FOR PRACTICAL:ZP-5.1 BASED ON PAPER Z-5.1:CELL AND DEVELOPMENTAL BIOLOGY

a) Cell Biology:

1. Proceedure for Preparation of fixative:Formaldehyde (6%), Alcohol (10% to90%),Carnoy's fluid, Bouin's fluid.

2. Proceedure for the Preparation of stains: Borax carmine (alcoholic), Eosin (alcoholic), Harri's and iron alum hematoxylene, aceto-carmine, aceto- orcine, Giemsa stain.

3.Study of ultrastructure of cell organells (using charts).

4. Observation and study of permanent slides of onion root tip to study all stages of mitosis.

5. Observation of permanent slides of grasshopper tastes to study various stages of meiosis.

6. Squash preparation of onion root tip to study stages of mitosis.

b)Developmental Biology

7. Stages of development of frog: The study of cleavage stages, Blastula, Gastrula and Neurula(sections) .

8. .Study of permanent slides of chick embryos: 18hrs, 24hrs,33hrs and 48hrs(whole **mounts).**

9. .Study of permanent slides of chick embryos: TS of 18hrs and 24hrs.

10. Preparation of chick embryo mount

FORMAT FOR QUESTION PAPER FOR PRACTICAL:ZP-5.1 BASED ON PAPER Z-5.1:CELL AND DEVELOPMENTAL BIOLOGY

Maximum Marks : 40

Q.1.	Explain the Procedure to Prepare the following fixative and stain. 1) 2)	:	2 x 2 = 4
Q.2	Identification of cell organelles (from the charts) (2-cell organelles, 1-mitosis and 1-meiosis	:	4 x 2 =08
Q.3	Squash preparation of onion root tip/ grasshopper testis/ flower bud of onion	:	05
Q.4	Identification of embryological slides(1-frog, 1-chick WM, 1-chick TS)	:	06
Q.5	Mounting of Chick embryo	:	07
Q.6	Record Book	:	5

Key Note to the Examiners:

1.If the Embryo is not developed in egg, the Students are asked to identify the given Permanent slide and write Characters with neat labelled diagram.

2.Charts are used for identification of cell organelles

Z.5.2 Environmental biology and wild life zoology

1.	**ENVIRONMENTAL BIOLOGY** Introduction, Definition, basic concepts of ecosphere; Hydrosphere; Lithosphere and Atmosphere	2	HRS
2.	**HABITATS** Marine habitat, zonation of sea, freshwater habitat, lentic and lotic systems. Terrestrial habitat - a brief account of forest, desert and biomes. Ecological adaptations of aquatic and terrestrial animals.	4	Hrs
3.	**THE ECOSYSTEM** Definition, Structure and functions of ecosystem. Nutrient cycles in ecosystem, Energy flow in ecosystem. Major ecosystems - Natural ecosystem (fresh water - e.g., pond water, Forest) Artificial ecosystem : crop land. Food chain in ecosystem and food web. Ettonian pyramids.	8	Hrs
4.	**ENVIRONMENTAL POLLUTION:** Air pollution : Definition, sources of air pollutants, their effects. Water pollution : definition, sources of water pollutants, their effects. A brief note on noise pollution and solid wastes.	8	Hrs
5.	**NATURAL RESOURCES AND CONSERVATION** Renewable and non renewable energy resources. Soil erosion and forest conservation.	4	Hrs
7.	Ecological adaptations; aquatic, aerial and terrestrial 4 hrs		
8.	Biotic relationship in animals; mutualism, commensalism and parasitism 3 hrs		

WILD LIFE ZOOLOGY

1.	**WILD LIFE** Introduction and definition protected Areas; Wildlife sanctuaries National Parks and Biosphere reserves. Hotspots of biodiversity causes for depletion of wildlife. Hunting, over harvesting, habitat destruction Habitat Degradation, effects of climatic changes on biodiversity.	3	HR
2.	**WILD LIFE CONSERVATIONS** Need for wild life conservation, Types of Conservations: In site and ex-site conservations protect Tiger and protect Lions. N.G.O.'s involved in wild life protection in India BNHS, IDCN Govt., and non govt organization. Wild life protection Act 1972 and its attendments Red data books, blue date book and Green data books CITES, Red data book.	5	HRS

SYLLABUS FOR PRACTICAL-ZP.5.2
(BASED ON SEMESTER –VI)
ENVIRONMENTAL BIOLOGY AND WILD LIFE BIOLOGY

A. ENVIRONMENTAL BIOLOGY:

1. Study of tropical pond as an ecosystem: Study of fauna & flora
2. Study of aquarium as an ecosystem: Study of fauna and flora
3. Study of community: By Line transect to determine frequency, density, and abundance of different species present in the community.
4. Estimation of dissolved oxygen, carbon dioxide & Total hardness of water, chloride
5. Study of ecological adaptations and morphological peculiarities: Hermit crab, Stick insect & Glow worm, Stink bug, Puffer fish, Anglerfish, Exocoetus, Phrynosoma, Draco, Chamelion & Bat
6. Study of biotic relationship: Root nodules, Liver fluke, Tapeworm, Suckerfish, Insectivorous plants

B. WILDLIFE BIOLOGY:

1. Study of threatened animals of India(by models, pictures,charts): Tiger,Lion,One horned Rhinoceros, Gaur,Golden langur,Lion tailed monkey,Musk deer,Hangul (kashmir stag),Great Indian bustard and Indian Rock Python.
2. Location of Species of zoological interest on the Indian and world map. Retitae birds, Tiger, Lions, Gorilla, Hippopotamus, Rhinoceros, Dipnoi and Peripatus.
3. Location of Tiger reserves, National parks, Biosphere reserves.

FORMAT QUESTION PAPER FOR PRACTICAL : ZP-5.2 BASED ON SEMSTEER –VI
PAPER Z - 5.2 :

ENVIRONMENTAL BIOLOGY, AND WILD LIFE MANAGEMENT)

Maximum marks : 40

Q.1 Estimate and explain the Presence of dissolved oxygen/carbon dioxide/chloride– from given water sample and write the estimation procedure 10

Q.2.A. Described its morphological Peculiarities and ecological adaptations 05

2.B. Describe its biotic relationship.

Q. 3 Identify and comment on wild life status of the animals (endangered species) : 06

4 Mapping of Landscapes with animals :2X2=4

5 Project Report :05

6 Viva voce :05

7 Record Book :05

Key Note to the Examiners:

1.For Question no.2 and 3 Models or Charts may be Used

2.For Question No.4 Mapping of

a) Distribution of Endangered animals.

b) Distribution of Lung fishes and flightless birds.

c)Mapping of Deserts on world Map.

d)Mapping of land masses in on Indian Map.

OPEN ELECTIVE SUBJECTS FOR ZOOLOGY, V.S.K UNIVERSITY ,BALLARI

V semester **40 hrs**

Syllabus

Unit-1: Poultry **10 hrs**

- Aim and scope of poultry.
- Poultry farm management.
- Poultry breeds -indigenous and exotic breeds.

Unit -2: **10 hrs**

- Poultry feed and its composition.
- Nutritive value of egg and meet.
- Poultry diseases and their control measures.

Unit -3: Apiculture **10 hrs**

- Morphology honey bee,
- Social organization in bee colony.
- Products of apiculture industry and its uses (honey and wax).
- Mouth parts and sting apparatus of bee.

Unit -4: **10 hrs**

- Modern methods of bee keeping (Newton and Langstroth).
- Methods of extraction of honey.
- Selection of bee species for apiculture.
- Medicinal value of honey and bee wax.

REFERENCES

1.Perspectives in Indian Apiculture – R.C Mishra.
2.Entomology and pest management – Pedigo.L.P
3.Apiculture – Prost.P.J (1962) Oxford and IBH, New Delhi.
4.A Text book of Applied Entomology- Srivastava,.K.P.
5.Elementsof Economic Entomology – David D.V and Kumara swami, Popular Book dept,Madras-1988.

SIXTH SEMESTER

Z 6.1 GENETICS AND BIOTECHNOLOGY

40 Marks

Code : **Z-6.1** Univ Code :
Contact Hours :54 Work load : 3 hours per week
Credit Points :

Evaluation: Continuous Internal Assessment - 30 marks
Semester and Examination - 70 marks

1. INTRODUCTION TO GENETICS 4 hrs

Mendelian Genetics and its practical applications, Mendelian laws with examples,, Back cross and test cross.

2.	**MULTIPLE ALLELES** Concept of multiple alleles, coat colour in Rabbit**,** ABO & Rh factor Blood group system. Concept of multi genes (polygenic inheritance) with reference to skin colour in man.	4	hrs
3.	**GENE INTERACTION** Concept of gene interaction, co-dominance and incomplete dominance. Complementary factors (9:7), Supplementary factors(9:3:4), Inhibitory factors(13:3), Duplicate dominant factors (15:1), Lethal genes (dominant and recessive), Epistasis	6	hrs
4.	**CHROMOSOMES** Introduction to morphology, composition and classification based on centromere position, types of chromosomes (autosomes, sex chromosomes, polytene and lampbrush chromosomes). Chromosomal aberrations: numerical and structural	4	hrs
5.	**SEX- DETERMINATION** Chromosomal : XX-XY ,ZZ-ZW ,XX-XO methods, Haploid-Diploid, parthenogenesis, Gynandromorphy. Environmental- Sex determination in Bonellia	4	hrs
6.	**HUMAN GENETICS** Preparation and analysis of human karyotype. Syndromes - autosomal abnormalities :Down's (Mongolism), Criduchat syndrome. Sex chromosomal abnormalities in man: Klinefelter and Turner syndrome. Inborn errors of metabolism: albinism, phenylketonuria and alkaptonuria	4	hrs
7.	**SEX LINKED INHERITANCE IN HUMAN** Colour-blindness, Haemophilia and hypertrichosis. Sex -influenced genes- Pattern baldness in human	2	hrs
8.	**NUCLEIC ACIDS** Structure of DNA, Types of DNA-A,B,Z & H forms, Types of RNA and its functions. Physieo-chemical properties of DNA. DNA as genetic material- evidences. RNA as genetic material in viruses	2	hrs
9.	Central Dogma of Molecular Biology DNA replication in prokaryotes, eukaryotes. Types of replication, experimental proof that DNA replication is semi conservative type. Components of protein biosynthesis, mechanism of protein biosynthesis. Genetic code, properties of genetic code, wobble hypothesis.	4	hrs
10.	Regulation of Gene Activity: Gene regulation in prokaryotes-Lac operon concept	2	Hrs
11.	Genetic engineering: Tools used in r-DNA technology. Applications of genetic engineering in medicine and agriculture	2	Hrs

REFERENCE BOOK

1. Molecular biology of cell,3rd ,4th edition, Alberts B.D. Lewis J. Raff M. Roberts K. And Watson.
2. Gene, Vol. V,Vl,Vll,Vlll and lX, Lewis B., Oxford University Press, Oxford.
3. Molecular biology of the genes, 1993, Watson J. Hopkins, Roberts Steitz & Weiner, Benjamin Cummings.
4. Cell and molecular biology, 1996, G. Karp,John Willey & Sons, U.S.A. Text Book of Molecular Biology, 1994,K. Sivarama sastry G. Padmanabhan and C. Subramanyam : Macmillan, India

SYLLABUS FOR PRACTICAL ZP 6.1
BASED ON PAPER Z – 6.1
GENETICS AND BIOTECHNOLOGY

1. Genetic problems: Monohybrid inheritance
2. Genetic problems: Dihybrid inheritance
3. Genetic problems: Multiple allels-ABO blood group in human
4. Detection of A, B and O blood groups and Rh factors; explain the inheritance.
5. Sex-linked inheritance in Drosophila.
6. Interaction of genes (two problems).

7. Sex-linked inheritance in humans
8. Calculation of allele frequency-ABO blood group in humans, Rh factor and calculating frequency of occurrence
9. General morphology of Drosophila and identification of different mutants in drosophila (dominant mutation, recessive, pleotrophic mutation and bar eye
10. Preparation of salivary gland chromosomes of Drosophila/ Chironomus larvae
11. Study tour is compulsory, students are supposed to submit the brief tour report at the time of practical examination

FORMAT OF QUESTION PAPER FOR
PRACTICAL Z-P.6.1
GENETICS, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Maximum Marks : 40

Q.1	Squash preparation of salivary gland chromosome of Drosophila/ Chironomous larvae	:	10 x 1 = 10
Q.2	Detection of blood group (A,B,O) and Rh-factor. Give the genetic Significance	:	5 x 1 = 5
Q.3	Genetic problem (monohybrid).	:	05
Q.4	Genetic problem (dihybrid/ multiple alleles)	:	05
Q.5	problem on sex-linked inheritance/ interaction of genes	:	05
Q.6	Viva voce	:	05
Q.7	Record Book	:	05

Key note to the Examiners:
1)For Question no 1-in case of lack material in the college, the candidates are asked to write the characters of salivary gland chromosome with a neat labelled diagram and also to write the Procedure and staining of Salivary gland chromosome of chironomous larvae.

SIXTH SEMESTER THEORY

Z.6.2 Ethology, Evolution and Zoo Geography

ETHOLOGY

1. ANIMAL BEHAVIOUR — **3 Hrs**
Definition and types of animal behaviour-innate behaviour-taxes, reflexes, instincts and motivation. Learned behaviour- habituation, imprinting and conditioned reflexes

2. SOCIAL ORGANIZATION — **2 Hrs**
Features of social organization. Social life in Honey bee & Termites

3. MIGRATORY BEHAVIOUR — **3 Hrs**
Migration in fishes : Anadromous and catadromous migration with Hilsa and Anguilla.
Migration in birds :Origin of migration, types of migration, advantages of migration with suitable examples.

4. Parental care -in fishes and amphibians **4hrs**

4. COURTSHIP BEHAVIOUR — **2 Hrs**
General principles and significance. Courtship and amphibians and birds,

5. NEST AND NESTING BEHAVIOUR — **3 Hrs**
Nest and nesting behaviour in birds with special reference to baya birds

6. COLOURATION AND MIMICRY — **3 Hrs**
Definition classification of mimicry-A) Aggressive, protective and warning. B) Batesian and Mullerian mimicry with suitable e.g.,

ORGANIC EVOLUTION

1. INTRODUCTION — **3 HRS**
Origin of life-Abiogenesis, biogenesis. Chemical evolution, Stanley Miller's expt

2. **EVIDENCES IN FAVOUR OF ORGANIC EVOLUTION** — **3 HRS**
Evidences from anatomy, embryology and palaeontology

3. THEORIES OF ORGANIC EVOLUTION **6 HRS**

Lamarckism ,Darwinism, Mutation theory, Neo-Darwinism and Modern synthetic theory

4. SPECIATION **4 HRS**

Types of speciation(allopatric and sympatric), mechanism of speciation

5. **ZOO-GEOGRAPHY** **5 HRS**

1. Realms and their characteristic fauna
2. Animal distribution : Continuo's & discontinuous with examples
3. Barriers of dispersal

SYLLABUS FOR PRACTICAL ZP-6.2
(BASED ON PAPER Z-6.2:)
ETHOLOGY, EVOLUTION & ZOO GEOGRPAHY)

1. Winking of eyes, knee jerks and spider web experiments to explain innate and learned behaviour.
2. Observation of bee hive, ant colony from curtain and pagoda nests and termite mound.
3. Observation of migratory in birds
4. Observation of courtship behaviour in birds (sparrows, fowl, Peacock, pigeon).
5. Observation of parental care in the animals as studied in the theory (pisces: Hippocampus,Arius, Amphibian:Icthyophis, Birds:Myna,Jacana).
6. Observation of nesting behaviour in the birds
7. Observation of butterflies,Stick insects, leaf insects & Chamelion for the coloration & mimicry.
8. Study of homologous organs- Forelimbs of Frog & bird; mouth parts of cockroach & mosquito, serial homology in crustacea(appendages).
9. Study of analogous organs- vertebrae & cephalopod eye, wing of bird & insect.
10. Study of vestigial organs-appendix, coccyx & molar teeth in man.
11. Study of models of Dinosour. (Ichthyosaurus,Tyrranosaurus,Brontosaurus,Stegosaurus & Triceratops).
12. Study of Archeopteryx.
13. Study of models of fossil man. (Any 4 available models).
14. Field oriented projects:
    a) Study of nesting and roosting places in birds.
    b) Local treks for nature study: Study of termite mounds & identification of castes/ bee colonies/ ant colonies/ Monkey troops, etc for behavioral study.

Observation of mimicry / coloration in local animals

FORMAT OF QUESTION PAPER FOR
PRACTICAL Z-P.6.1
GENETICS, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Maximum Marks : 40

Q.1	Squash preparation of salivary gland chromosome of Drosophila/ Chironomous larvae	:	10 x 1 = 10
Q.2	Detection of blood group (A,B,O) and Rh-factor. Give the genetic Significance	:	5 x 1 = 5

Q.3	Genetic problem (monohybrid).	:	05
Q.4	Genetic problem (dihybrid/ multiple alleles)	:	05
Q.5	problem on sex-linked inheritance/ interaction of genes	:	05
Q.6	Viva voce	:	05
Q.7	Record Book	:	05

Key note to the Examiners:
1)For Question no 1-in case of lack material in the college, the candidates are asked to write the characters of salivary gland chromosome with a neat labelled diagram and also to write the Procedure and staining of Salivary gland chromosome of chironomous larvae.

B.Sc I semester examination May/June 2017
Subject: Zoology
Paper Z.1- Biology of chordate

Time: 3hrs maximum marks: 70

Instructions:1. All questions are compulsory

2. Draw labeled diagrams wherever necessary

Section A

I. Answer any five of the following (5*2=10)

1
2
3
4
5
6

Section B

II answer any six of the following (6*5=30)

7
8
9
10
11
12
13
14

Section C

III answer any three of the following (3*10=30)

15
16
17
18
19