

Karnataka State Women's University,
Bijapur.

Syllabus for Under graduate Students in Zoology

WITH EFFECT FROM
2010-11 Academic year and onwards

B.SC DEGREE (SEMESTER) COURSE IN ZOOLOGY
(WITH ZOOLOGY AS ONE OF OPTIONAL SUBJECTS)
SCHEME OF TEACHING AND EXAMINATION

Sem. No	Course No.	Paper No. and Theory	Teaching Hrs/wk	Exam Duration	Exam Marks	Internal Marks	Total marks
I	Optimal Zoology	Z . 1 Biology of Non Chordata	4	3	80	20	100
	Practical	Z.P.1	3x2=6	3	40	10	50
II	Optimal Zoology	Z . 2 Biology of Chordata and Histology	4	3	80	20	100
	Practical	Z.P.2	3x2=6	3	40	10	50
III	Optimal Zoology	Z . 3 Applied Zoology	4	3	80	20	100
	Practical	Z.P.3	3x2=6	3	40	10	50
IV	Optimal Zoology	Z . 4 Physiology ,biochemistry and Immunology	4	3	80	20	100
	Practical	Z.P.04	3x2=6	3	40	10	50
V	Optional Theory	ZP -5.1 Genetics	04	03	80	20	100
	Practical	ZP-5.1 Genetics	03	03	40	10	50
V	Optional Theory	ZP 5.2 Animal behaviour, evolution and paleontology	04	03	80	20	100
	Practical	Paper ZP- 5.2	03	03	40	10	50
VI	Optional Theory	ZP-6.1 Cell biology and developmental biology	04	03	80	20	100
	Practical	Paper-ZP-6.1	03	03	40	10	50
VI	Optional Theory	ZP-6.2 Ecology , zoogeography and wild life biology	04	03	80	20	100
	Practical	Paper ZP-6.2	03	03	40	10	50

B. Sc. I Semester
Syllabus for Paper Z.1
Biology of Non Chordata(60 Hrs)

- I. Introduction:
Principles of animal classification. Definition of Species. 02 Hrs
- II. Biodiversity:
Levels of biodiversity - Species, genetic, Ecosystem level diversity. No. of species in different groups in India. Ecological diversification. 05 Hrs
- III. Phylum- Protozoa:
General characters of the phylum and classification up to classes with distinctive characters and suitable examples. Structure and life history of human parasitic protozoans. - *Entamoeba histolytica* and *Plasmodium vivax* 06 Hrs
- IV. Phylum- Porifera:
General characters of the phylum and classification up to classes with distinctive characters and suitable examples. Histology, spicules and canal system in sponges. 05 Hrs
- V. Phylum- Coelenterata:
General characters of the phylum and classification up to classes with distinctive characters and suitable examples. Structure and life Cycle of Hydra; Formation and types of Coral reefs. 06 Hrs
- VI. Phylum - Platyhelminthes:
General characters of the phylum and classification up to classes with distinctive characters and suitable examples. Structure and life cycle of *Taenia solium*. Host parasite relationship and parasitic adaptations 05 Hrs
- VII. Phylum: Nematelminthes:
General characters of the phylum and classification up to classes with suitable examples. Parasitic adaptations of Guinea worm, encysted micro filaria, and hook worm. 03 Hrs
- VIII. Phylum- Annelida:
General characters of the phylum and classification up to classes with distinctive characters and suitable examples Ecological adaptation of polychaeta, Type Study : *Pheretima posthuma* (External morphology, Digestive System ,Nervous system and Reproduction) Structure and life cycle of *Pheretima posthuma* 07 Hrs
- IX. Phylum-Arthropoda:
General characters and classification up to classes with distinctive characters and suitable examples. *Palaemon* –Externals, appendages, Digestive and nervous system. Ecology and

distribution of bees, locusts, butterflies, and termites. Arthropoda pests and their management with relevance to paddy, sugarcane. (2 pest) 10 Hrs

X. Phylum- Mollusca:

General characters and classification up to classes with suitable examples. Type study of Unio: External morphology, Digestive System and Nervous system 04 Hrs

XI. Phylum- Echinodermata:

General characters and classification up to classes with suitable examples. Structure and life cycle of star fish, larval forms of Echinodermata 07 Hrs

Syllabus for Practical- ZP.1
Based on Semester – 1, Paper – Z. 1
Biology of Non- Chordata

A. Museum Specimens and Slides:

Commonly available specimens cited in the list of examples for the theory are to be selected.

Protozoa: - Rhizopoda: Amoeba, *Entamoeba histolytica*

Mastigophora: Euglena, Trypanosome

Opalinata: Opalina

Sporozoa: Plasmodium sp.

Ciliata: Vorticella/ Paramecium

Porifera; - Calcarea: Leucosolenia/ Sycon

Hexactinellida: Hylonema/ Euplectella

Demospongia: Spongilla/ Bath Sponge, Spicules, Gemmule

Coelenterate: - Hydrozoa : Hydra, Physalia

Scyphozoa: Aurelia

Anthozoa: Pennatula, Gorgonium, Metridium (any 2)

Platyhelminthes: - Turbellaria: Planaria

Trematoda: *Fasciola hepatica* [Miracidium, Cercaria, Redia, Metcercaria
(any 2)]

Cestoda: *Taenia solium*

Nemathelminthes: - *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria bancrofti*,
Enterobius vermicularis, *Dracunculus medinensis* (Any 2)

Annelida: - Oligocheta: Pheretima

Polycheta: Nereis, Sabella, Terebella, Chetopterus (Any 2)

Hirudinea: Hirudinaria

Arthropoda: - Onychophora: Peripatus

Crustacean: Palaemon, Balanus, Cancer (Any 2)

Myriapoda: Scolopendra, Scutigera

Arachnida: Limulus

Insecta : Lepisma, Blatta, Orientalis, Termite, Honeybee, Butterflies, Moth (any 2)

Vectors: *Anopheles culicifacies* (malaria mosquito), *Anopheles stephensi* (malaria mosquito),
Aedes aegypti (dengue mosquito)

Pest insect: any 2 pests of local crops- Wasps, Spiders

Mollusca; - Polyplacophora: Chiton

Scaphopoda: Dentalium

Gastropoda: 1. Marine- Patella

2. Non- Marine –Pila

Pelecypoda- 1. Marine- Mytilus

2. Non Marine- Unio

Cephalopoda: Sepia, Nautilus, Octopus (any 2)

Echinodermata: - Asteroidean: Asterias

Ophiuroidea: Ophiothrix

Holothuroidea: Echinus

Crinoidea: Antedon

B. Field Oriented Project:

1. Visit to near by gardens/ cropland/ grassland/ forestland/ river/ stream/ sea/ sanctuaries/ national park to study the animal diversity.
2. Bird watch and preparation of check list of birds of college campus.
3. Identification of local edible fishes.
4. Listing and identifying local butterflies and preparation of checklist of butterflies of college campus.
5. Listing and identifying terrestrial and fresh water mollusks in the surroundings of college/ village.

C. Dissections:

1. Dissection of earthworm- digestive system, nervous system

Mountings in earthworm- setae, ovary, spermatheca.

2. Dissection of cockroach/ prawn. - digestive system, nervous system, reproductive organs.

Mountings in cockroach- salivary glands, mouth parts, malphigian tubules.

Prawn- appendages of prawn.

Format of question paper for Practical. Zp-1

Based on Semester 1- paper Zp-1

Biology of Non Chordata

Max marks- 40

Q1. Museum specimens and slides number

8×2- 16

Q2. Dissection

10

Q3. Mounting

04

Q4. Record book

05

Q5. Field work report

05

B.Sc. II SEMESTER SYLLABUS

Paper 2.1 BIOLOGY OF CHORDATA AND HISTOLOGY

- I. General characters of phylum chordata and classification up to Sub phyla Hemichordata ,urochordata, cephalochordawith suitable example.Retrogressive metamorphosis in urochordata.General characters vertebrata and outline classification up to classes.
- II. Cyclostomata-General organization, distribution and ecology of petromyzon
- III.Pisces: General characters and distribution with suitable examples of Oestichthyes and Chondryichthyes.
- IV. Amphibia- General characters and classification up to orders with suitable examples.Origin and evolution of Amphibia.
- V. Reptilia- General characters and classification up to orders with suitable examples Living orders only. Ecology and distribution of chelonians, crocodiles and lizards.Structure and poisonous apparatus of cobra.Poisonous and non poisonous snakes of India.
- VI. Aves:General characters and classification . Distinctive features of Archaeornithes and neornithes with reference to palaeognathae ,impennae, and neognathae giving suitable examples. Wet land and shore birds.Flightadaptations.Economic importance of birds.
- VII. Mammalia: : General characters and classification up to classes. Distinctive features of prototheria, and metatheria, .Important characters and distribution of chiroptera, primata, rodentia, cetacean, carnivore, ungulate. The type study of rat (muscular and skeletal system are excluded)

Part – B Histology

15 hrs

Histological study of following organs

- 1.Tongue,2.Stomach,3. Intestine, 4.Liver,5. Pancreas,
- 6.Kidney,7.AdrenalGland .8.Thyroid, 9.Ovary, 10.Testis.

SYLLABUS
B.Sc. III SEMESTER
PAPER-Z 3.1 60 HRS

I. Poultry: 10 Hrs

Aim and scope of poultry. Poultry form management Poultry breeds in India. Rearing house equipment, food, and its composition, broilers, layers. Nutritive value of egg and poultry meat. A note on poultry diseases. (Nutritional deficiency diseases- Poly neuritis, viral diseases: Ranikhet, Bacterial diseases: Fowl Cholera, protozoa : Coccidiasis), symptoms, remedies, and their control.

II. Apiculture 08Hrs

Honey bee morphology, mouth parts, honey sac, wax glands, types of different species and races, management of bee keeping (modern method) Economic importance of honey, wax, pollen, venom and bee pollination. production on honey, its chemical composition and honey bee diseases.

III. Sericulture : Brief history and concept of sericulture : 12 Hrs

1. **Moriculture**, different types of mulberry (Morusalba, Moruscodifelia, Morusindica, Morusnigra. Grainage – grainage activities, Silk worm rearing, Post harvest technology Life cycle of Bombyxmori, environmental condition needed for rearing, modern method of rearing house, rearing equipmentschawki, worm and adult worm rearing methods. Non mulberry silk worm (ex. Muga and Tasar) Silk worm pests and predators A note on silk worm diseases. Bacterial diseases (Digestive track) Muscardine (white or green muscardine) protozoan diseases (Pebrine), and viral diseases (Grasseria).

IV. Aquaculture: 12 Hrs

Principle, scope, techniques and importance of culturing economically important aquatic animals. Brief account of Indian major carps and fresh water prawn. Induced breeding of major carps and seed fish. Endocrine regulation of fish reproduction. A note on fish by products and fish diseases.

V. Dairy forming : 10 Hrs

Importance, scope, management of forming animals breeds of cows and buffaloes Nutritional requirements housing and hygiene of dairy animals. Milk and milk products. Processing,

preservation and marketing. Breeding techniques - artificial insemination. Breeding programme to improve local breeds.

VI. **Vermiculture:** Vermiculture its concept and importance Procedure of Vermiculture (small scale large scale) Role of earthworm in soil fertility. 04 Hrs

VII. . Pearl culture ; Microscopic structure of Shell : Pearl formation. 04 Hrs

SYLLABUS FOR PRACTIAL- ZP-3.1

BASED ON SEMESTER III PAPER 3.1

1. Visit to poultry for the study of different breeds and identification of ectoparasites(Chick mite , fowl tick and ascertaining freshness, sterile conditions, of aves (report to be submitted)
2. Visit to dairy form or milk processing and packing centre and study of equipment in dairy.
3. Visit to nearby hospital for observation of breeding techniques and study equipment used in dairy.
4. Visit to silk rearing centre to observe rearing activities and study of equipment used in silk worm rearing ((report to be submitted)
5. **Food fishes**
 - a. Catlacatla, b. Mrigala, c.Anabas, d. Mackerel, e.Sardine, F. Mugil, g. Rohu, h.Channa i. Shark.
6. Visit to aquaculture form to observe activities of aquaculture (report to be submitted)
7. Study of mouth part and sting apparatus of honey bee , nature and use of beehive , bee wax and honey
8. Life cycle of Bombyxmori including external including male and female . Mulberry and non mulberrycocoons .diseases, muscardine, pebrine, Grasserie and Flacherry.
9. Biproducts of fisheries , poultry, dairy and sericulture : fish oil, milk powder, fowl excreta, Dry cocoons and silk worm excreta.

SCHEME OF PRACTICAL EXAMINATION MAX MARKS 40

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|--|----------|
| 1. Dissection of silk gland in silk worm Caterpillar / Mounting of Honey bee mouth parts / Sting apparatus | 10 marks |
| 2. Spotting 8+2n (Diseases) 10 No. x 2 | 20 marks |
| 3. Project report- | 05 marks |
| 4. Journal - | 05 marks |

REFERENCES

1. Fishery management Ashish publications By SC Agarwal
2. A text book of Fishery science and Indian fishery, SrivastavaKitabmahal Allahabad, India.
3. Fish and fisheries of India , Hindustan publishing corporation , New Delhi.
4. Silk worm breeding stocks central silk board, Manne Drive Bombay
5. The ABC and XYZ of Bee culture , Roger ,A, Morse : Tata McGraw Hill Publishing Co. ltd. New Delhi.
6. Live stock and poultry production ,prentice hall of India , New Delhi.

7. Economic zoology- Upadhyya
8. Economic Zoology- Dr. Jawadhasanand Dr. Subhas Prasad Sinha, S.Chand co, New Delhi
9. Economic entomology Alkaprakash and Fennamore
10. Applied entomology-D.R. Thembre
11. Economic zoology by Jaya surya and N.ArmugamSaras Publishers
12. Applied Zoology by Tomer and Bhatnagar ,Emkay Publishers

B.SC. IV SEMESTER SYLLABUS- 60 HRS
PAPER- IV: PHYSIOLOGY, AND BIOCHEMISTRY

- 1) Introduction: Branches of physiology, scope of physiology 01 Hrs
- 2) Digestion: Mechanical digestion and chemical digestion-Digestion and absorption of proteins, carbohydrates and lipids 04 Hrs
- 3) Respiration: External and internal respiration – Respiratory pigments Hemoglobin, haemocyanin and haemoerythrin. Physiology of respiration – exchange of gases, transport of O₂, oxygen dissociation curves – both's effect, transport of CO₂ , chloride shift, respiratory quotient 06 Hrs
- 4) Circulation: Types of circulation – structure, functions and regulation of human heart, blood pressure, composition of human blood, neurogenic and myogenic hearts. 05 Hrs
- 5) Nitrogen excretion: 04 Hrs.
Nitrogen excretion in aquatic and terrestrial animals –Ammonotelism and ureotelism and uricotelism with examples. Ornithine (Urea) cycle.Physiology of urine formation
- 6) Muscle contraction: Principle types of muscles. Ultrastructure of striated muscles, contractile proteins – myosin, actin, tropomyosin, troponin and actinin. Mechanism of muscle contraction and re'axation – the sliding filament theory 05 Hrs
- 7) Nervous co-ordination: Nature and conduction of nerve impulse – synaptic transmission, neuromuscular junction and neurotransmitters . 03 Hrs
- 8) Endocrine system: Functions of mammalian endocrine glands pituitary, thyroid, parathyroid, pancreas, adrenals, testis, ovary, placenta and pineal gland. Hypothalamus and its stimulatory and inhibitory hormones. 08 Hrs
- 9) Immunology: Immune system – General characteristic organs and cells of immune system, bone - marrow, primary lymphoid organ – Bursa of Fabricus, thymus, payer's patches- T and B cells– Antigens and antigenecity – immunoglobulin – structure of immunoglobulin G(IgG) and immunization, AIDS – Causative factors, effects and preventive measures. 08 Hrs

- 10) Enzymes : Classification of enzymes (IUB system), Mechanism of enzyme catalyzed action – lock and key method, induced fit hypothesis. Specificity of enzymes, reversibility of enzyme action, enzyme inhibitors, cofactors: 05 Hrs
- 11) Vitamins: Fat soluble vitamins (A,D,E and K) water soluble vitamins (B complex and vitamin C) functions and deficiency symptoms. 04 Hr
- 12) BIOENERGETICS: Concept of Bioenergetics, free energy changes, glycolysis. Bioenergetics of glycolysis. Krebs's cycle – electron transport chain and phosphorylation, bioenergetics of Krebs's cycle. 07 Hrs

SYLLABUS FOR PRACTICAL – Z.P 4

BASED ON IV SEMESTER PAPER–ZP .4

PHYSIOLOGY , BIOCHEMISTRY AND IMMUNOLOGY

1. Qualitative tests for the detection of carbohydrates , proteins and fats in the given sample
2. Qualitative tests for the detection of nitrogenous excretory waste in the given samples for ammonia and uric acid)
3. Detection of abnormal excretion of sugar (glucose and albumin) in the human urine.
4. Blood smear preparation staining and study of human blood
5. Differential count (DC) of white blood cells of human blood using blood smear slides.
6. Total count of white blood cells (WBCS) of human blood .
7. Total count of Red blood cells (RBCS) of human blood .
8. Estimation of haemoglobin in human blood(Sahlis method).
9. Determination of hematin crystals from human blood.
10. Determination of bleeding and clotting time of human blood.
11. Salivary amylase activity test for human saliva.
12. Osmotic hmolysis in animal cells (RBC Cells from human/frog blood)

QUESTION PAPER FORMAT FOR PRACTICAL – Z.P 4.1
BASED ON IV SEMESTER PAPER–ZP .4.1
PHYSIOLOGY , BIOCHEMISTRY AND IMMUNOLOGY

Maximum Marks : 40

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| 1. Qualitative tests for carbohydrates , proteins and fats/Detection / normal an abnormal constituents of urine | 10 M |
| 2. Preparation of blood smear slide and DC OF WBCs/TC of RBC /TC OF WBC. | 10 M |
| 3. Estimation of haemoglobin/preparation of hematin crystals in human blood. | 05 M |
| 4. Detection of activity of salivary enzyme / Determination of bleeding and clotting time of human blood | 05 M |
| 5. Record book | 05 M |
| 6. Viva voce | 05 M |

REFERENCES:

1. Mammalian Physiology and General biology- R.S. Thakur and P.G. Puranik
2. Animal physiology: Sambasiva ,kamalakarRao, Augustine challappa
3. Animal physiology and related biochemistry –H R Singh
4. Animal physiology :A.Mariakuttekan, N.Armugam
5. A text book of Animal physiology – AK Berry
6. A text book of Animal physiology- AK Goel KV Sastry and Tyagi
7. A text book of physiology –Nagabhushan
8. Animal Physiology- verma and Agarwal, Chand co
9. Human Physiology Chatargi.

SEMESTER –V THEORY
SYLLABUS FOR PAPER ZOOLOGY 5.1
GENETICS 60 Hrs

1. Introduction: 03 Hrs
History of genetics, branches of genetics, heredity and variation. Practical applications of genetics. Genetics Terminology.
2. Chromosomes: 05 Hrs
Chromosome number, size chromosomal morphology, and types, structure and models. Heterochromatin and euchromatin. Giant chromosomes – polytene and lampbrush.
3. Nucleic acids, and protein biosynthesis: 08 Hrs
Introduction: Identification of genetic material – Griffith's experiment. Chemistry of nucleic acids, structure of DNA, Watson and crick DNA model, replication of DNA. Forms of DNA, Types of RNA. Genetic code, properties of genetic code, wobble hypothesis, mechanism of protein biosynthesis.
4. Interaction of genes: 6 Hrs
 - a) Supplementary factors - 9: 3: 3: 1 Example: Comb pattern in fowls.
 - b) Dominant epistasis - 13: 3: plumage colour in Leghorn and Wyandotte.
 - c) Dominant epistasis - 12:3:1 Coat colour in dogs
 - d) Recessive epistasis - 9: 3: 4 – Coat colour in mouse.
 - e) Complementary factors - 9 : 7, flower colour in sweet peas,
 - f) Multiple factors / polygenic inheritance –Skin Colour in Man.
 - g) Lethal gene - Coatcolour in mice.
5. Multiple Alleles: 04 Hrs
Characteristics of Multiple Alleles, Inheritance of coat colour in Rabbit and ABO blood groups in human, Rh – factor, Isoalleles , Pseudoalleles and position effect.
6. Linkage and Crossing over: 04 hrs
Linkage: Theories of linkage, Linkage in Drosophila, linkage in man,
Crossing over: Mechanism of meiotic Crossing Over, Types of Crossing over, Cytological detection of crossing over (Stern's Experiment on Drosophila}, Significance of Crossing over.
7. Sex determination: 4 Hrs
Chromosomal mechanism of sex determination, Genic balance theory, Gynandromorphy and intersexes
8. Sex linked inheritance: 04 Hrs
Sex linked inheritance in Drosophila. Haemophilia and colour blindness in man. Sex linkage in poultry, Y linked genes.
9. Mutations 05 Hrs

a) Chromosomal aberrations- Human Diseases: Klinefelter's Syndrome, Turner's syndrome, Edwards Syndrome, Patau syndrome, Chi- du – chart syndrome and Down's syndrome (Mongolism).

b) Gene mutations – Types of gene mutation and Molecular basis of gene mutations.

10. Human genetics and eugenics: 05 Hrs

Common human genetic disorders in man-inborn errors of metabolism – Albinism, Phenylketonuria, Alkaptonuria, Sickle cell anaemia. Thalassaemia, Huntington's chorea, Eugenics.

11. Genetic engineering and biotechnology: 12 Hrs

Recombinant DNA technology, (Isolation of Gene, Endonucleases, Palindrome Sequence, Cloning Vectors-Plasmids, Gene Cloning), Production of insulin by r DNA technology, PCR, DNA finger printing and DNA vaccines. Applications of genetic engineering in Medicine, food technology and agriculture. Useful and harmful effect of biotechnology.

REFERENCES:

1. Concept of genetic, human – P.S. Verma, V.K. Agarwal
2. Genetics and Evolution – R.P. Meyyan
3. Genetics and Cytology – Verma and Agarwal
4. Genetics, Cell biology & Evolution – Arora
5. Genetics – Prof. N. Armugam
6. The Principles of Genetic by – P.K. Gupta
7. Genetics by – Dalela & Verma
8. Genetics – C.B. Power
9. Biotechnology By RC Dubay
10. A Text Book of Cell And Molecular Biology Dr. P. K. Gupta
11. Molecular Biology and Genetic Engineering Prof. P.K. Gupta

SYLLABUS FOR PRACTICAL: ZP -5.1

BASED ON SEMESTER-VI; PAPER Z-5.1

GENETICS

1. Genetic problems: Monohybrid inheritance -4 examples
2. Genetic problems: Dihybrid inheritance - 4 examples
3. Genetic problems: Interaction of genes - 2 examples
4. Genetic Problems: Multiple alleles – ABO blood group in human.
5. Sex – linked inheritance in human – 2 examples.
6. Calculation of allele frequency – PTC, tongue rolling, attached ear lobes in humans.
7. Calculation of allele frequency – ABO blood group in humans, Rh factor.
8. General morphology of Drosophila and identification of different mutants in Drosophila. (Bar eye, White eye, Curly Wings, Vestigial wings, Bilateral Gynandromorphism.)
9. Preparation of salivary gland chromosome of Drosophila / Chironomous larva.
10. Detection of Blood group A ,B , O and Rh. factor

FORMAT OF QUESTION PAPER FOR PRACTICAL Z.P 5.1

BASED ON SEMESTER – V PAPER Z- 5.1

GENETICS

1. Squash preparation of salivary gland chromosome of Drosophila/ chironomous larva. 10
2. Detection of blood group A, B, O and Rh factor. 06
3. Genetic problems : monohybrid ,dihybrid, multiple alleles, sex-linked inheritance (each One)
(4 problems x 2marks) 4 x 2 = 08
4. Spotting 3 (Drosophila Mutants Slides or Charts) 3 x 2 = 06
5. Viva Voce. 05
6. Record Book. 05

SEMESTER –V THEORY

SYLLABUS FOR ZOOLOGY PAPER: 5. 2

ANIMAL BEHAVIOUR, EVOLUTION AND PALEONTOLOGY 60 Hrs

- A. Animal Behavior: 40 Hrs
- 1) Definition and types of animal behavior: 08hrs
Innate behavior: Kinesis, Taxes, Reflexes, Instincts and Motivation,
Learned behavior: Habituation, Imprinting, Conditioned reflex and Insight learning.
- 2) Social organization 05hrs
Social organization in Honey bees, Termites and Macaques
- 3) Migratory behavior: 06hrs
a. Migration in fishes – Types of migration, anadromous and catadromous migration with reference to Hilsa and Anguilla.
b. Migration in birds- Methods of studying migration, preparation for migration, Types of Bird Migration, Orientation and Navigation.
- 4) Biological clock: 4Hrs
Introduction, Definition of chronobiology, Biological clock, origin of biological clock, various types of Rhythms.
- 5) Courtship behavior: Definition, general principles, courtship in scorpions and peacock. 4 Hrs
- 6) Parental care: Parental care in fishes and amphibians. 04Hrs
- 7) Nesting behavior in Birds: Nesting behavior in Birds -Types of Nests. 04hrs
- 8) Mimicry: Definition, types of mimicry, protective, aggressive and warning mimicry with suitable examples, coloration – types of coloration.05 Hrs
- B. Evolution: 12 Hrs
- 9) Theories of organic evolution: Lamarckism and Neo-Lamarckism. Darwin – Wallace theory of natural selection, synthetic theory of evolution. Gene mutation, gene flow, genetic drift, natural selection and isolation, Hardy – Weinberg equilibrium.
- 10) Speciation: Concept of species – sympatric and allopatric speciation,
11) Microevolution and Macroevolution.
- C. Paleontology: 08 hrs
- 12) Fossils and Fossilization, Types of Fossils, Significance of fossils. Origin and evolution of man.

REFERENCES: ETHOLOGY

- 1) Gundevia, H.S. & Hare Govind Singh. A Textbook of Animal Behaviour.
- 2) Fundamentals of animal behaviour – Sathguru Prasad.
- 3) Animal Behaviour By Mathur.
- 4) Agarwal, V.K. & Usha Gupta. S. Chand's simplified course in Ecology and Ethology.
- 5) Mathur, Reena, 1998. Animal behaviour. (Rastogi Publ., Meerut).
- 6) Arora, Mohan P. 2000. Animal behaviour. (Himalaya Publ. House).
- 7) Ranga, M.M., 2004. Animal behavior.
- 8) McFarland, David. Animal behaviour: Psychology, Ethology & Evolution. (ELBS Publ.).
- 9) Slater, P.J.B. 1999. Essentials of animal behaviour. (Cambridge Univ. Press).
- 10) Wallace, Robert A. 1979. The ecology and evolution of animal behaviour
- 11) Organic Evolution by Rastogi
- 12) Cytology, Genetics and Evolution Dr. P. K. Gupta
- 13) Genetic and Evolution – P.L. Kochlae
- 14) Organic Evolution – Richard Swann Leel.
- 15) Cytogenetics and Evolution – P.C. Vasista and S. P. Khanwala
- 16) Cytology, Genitics and Evolution – P. Arora.
- 17) Cytology, Genitics and Evolution – P.K. Gupta.
- 18) Cytology, Genitics and Evolution - Verma and Agarwal.
- 19) A text book of evolution – P.S. Singh.
- 20) Organic Evolution – Prof. N. Armurgum.
- 21) A text book of Evolution – Dalela and Verma.
- 22) Paleontology and Evolution – Agarwal S.C.

SYLLABUS FOR PRACTICAL –ZP 5.2

BASED ON SEMESTER –VI; PAPER Z-5.2

ANIMAL BEHAVIOUR, EVOLUTION & PALEONTOLOGY

1. Experiments on animal behaviour: Knee jerk, Blinking of Eye, habituation in Spider, Kohler and Kafka experiment and Pavlov's experiment on dog.
2. Observation of bee hive, ant colony and termite mound.
3. Watching the migratory birds for the timings of their arrival and departure and reporting their behavior. (Five Example)
4. Observation of parental care in the animals: Hippocampus, Arius, Tilapia, Ichthyophis, Alytes Jacana, Horn bill, Crocodile.
5. Observation of nesting behavior in the birds (local examples) Nesting in jacana, Tailor bird, Weaver Bird, Golden Oriole. Sparrow, Crow, Eagle, Parrot
6. Observations of butterflies, stick insects, leaf insects and chameleon for the coloration and mimicry.
7. Study of homologous organs – forelimbs of Vertebrates , mouthparts of cockroach and mosquito serial homology in crustacean (appendages)
8. Study of analogous organs – Vertebrates and cephalopod eye, wing of bird and insect.
9. Study of vestigial organs – appendix, coccyx and molar teeth in man.
10. Study of models of dinosaurs (Ichthyosaurus, Tyrannosaurus, Brontosaurus, Stegosaurus and Triceratops)
11. Study of model of Archaeopteryx.
12. Study of models of fossil man (any four available models)
13. Field oriented projects
 - a) Study of nesting and roosting places in birds
 - b) Local treks for nature, study of termite mounds and identification of castes/bee colonies /ant colonies/ monkey troops etc., for behavioral study.
 - c) Observation of mimicry/colouration in local animals.

FORMAT OF QUESTION PAPER FOR PRACTICAL ZP 5.2

BASED ON SEMESTER –V PAPER Z 5.2

ANIMAL BEHAVIOUR, EVOLUTION & PALAEOLOGY

- | | | |
|---|---|--------|
| 1) | Experiments on animal behavior (two) | 2x2=4 |
| 2) | Parental care- 2 spots | 2x2=4 |
| 3) | Social organization. 2 Spots | 2x2= 4 |
| (Any two individual from bees, termites, ants –Ex. Queen/ King/Worker/Solder) | | |
| 4) | Nesting-1 , Migration-1 and colouration-1: total 3 Spots | 3x2=6 |
| 5) | Evolution- 3 spots (a. Homologous, b. Analogous c. Vestigial) | 3x2=6 |
| 6) | Paleontology- 3 spots: | 3x2=6 |
| Any 3 models from Dinosaurs, Archaeopteryx and fossil man. | | |
| 7. | Project report. | 05 |
| 8. | Record book. | 05 |

SEMESTER VI.

SYLLABUS FOR PAPER 6.1

CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY

A.	CELL BIOLOGY:	20 Hrs
1)	History of cell biology and its branches. Cell Theory	02 hrs
2)	Study of light and electron microscope, cell fractionation, ultra structure of animal cell.	03 Hrs
3)	Cell organelles: Structure and functions of Plasma membrane, Mitochondria, Golgi complex, lysosomes, endoplasmic reticulum, Ribosomes, Nucleus., Centrioles, cytoskeletal elements	08 Hrs
4)	Cell cycle: Mitosis and meiosis, regulations of cell cycle.	04 hrs
5)	Biology of cancer: Types of cancer, characteristics of cancer cell, carcinogenic agents (physical, chemical and biological)	03 hrs
B.	DEVELOPMENTAL BIOLOGY:	(40Hrs)
6)	Introduction: Branches of Embryology, Scope of Embryology, Theories of development, pre formation and epigenetic theory.	03 hrs
7)	Gamatogenesis: Spermatogenesis and oogenesis – comparison between spermatogenesis and oogenesis,	05hrs
8)	Fertilization: Kinds of fertilization, approach of gametes, fertilization and antifertilization, acrosome reaction – cortical reaction – Amphimixis, monospermic and polyspermic fertilization, significance of fertilization	04 hrs
9)	Cleavage: Types of cleavage – Holoblastic, meroblastic, radial and spiral types with examples. Effect of yolk on cleavage.	03 Hrs
10)	Early development of frog: Structure of ovum, cleavage, blastulation and gastrulation.	04 hrs
11)	Early development of chick: Structure of hen's egg, cleavage, blastulation, gastrulation, origin and structure of primitive streak, structure of 24, and 48 hours chick embryos. Extra embryonic membranes.	08 Hrs
12)	Reproductive system and Early development of human: Menstrual cycle and its regulation. Structure of sperm and ovum, ovulation, cleavage, morula, blastocyst and implantation.	06 hrs
13)	Placenta:	02 hrs

Morphological and histological classifications of placenta with examples, structure and functions of placenta – yolk sac placenta, allantoic placenta.

14) Modern trends in human reproduction:

04 hrs

Sperm bank, IVF, cloning, surrogate mother and multiple births – twins.

REFERENCES :

Cell Biology

1. Cell Biology – C. B. Power
2. A text book of cytology -Dalela and verma
3. Cell biology – verma and Agarwal
4. Cell Biology – N. Armugum
5. Cell biology _ Singh and Tomer.

Developmental Biology

1. Elements of chordate embryology – P.K.G. Nair
2. Elements of chordate embryology _ K.P. Achar.
3. Elements of chordate embryology _ M.M. Trigungat.
4. Text book of embryology _ N. Armugum.
5. Chordate embryology _ P.S. verma, V.K. Agarwal, B. S. Tyagi.
6. A text book of animal embryology _ P.G. Puranik.
7. An introduction to embryology _ A.K. Berry.

SEMESTER VI: PRACTICAL SYLLABUS PAPER 6.1

A. CELL BIOLOGY:

- 1) Preparation of fixatives: Formaldehyde (0.6%), alcohol (10% to 90%) Carnoy's fluid, Bouins's fluid.
- 2) Preparations of stains: Borax carmine (alcoholic), Eosin (alc), Harishaematoyxlin (Iron alum) Acetocarmine, Acetoorcine, Schiff's reagent (Feulgen method), Giemsa stain.
- 3) Study of Structure of cell organelles using charts /slides/ models
- 4) Observation of study of permanent slides of onion root tip to study stages of mitosis.
- 5) Observations and study of permanent slides of grasshopper testis to study stages of meiosis.
- 6) Squash preparation of onion root tip to study mitosis.
- 7) Squash preparation of flower buds of onion/ grasshopper testis to study meiosis.

B. DEVELOPMENTAL BIOLOGY:

- 8) Stages of development of frog: The study of cleavage stages, blastula, gastrula and neurula (sections) and various stages of tadpole.
- 9) Study of permanent slides of chick embryos: 18 hrs, 24 hrs, 36 hrs and 48 hrs (whole mounts).
- 10) Study of permanent slides of chick embryos – T.S. of 18 hrs. 24 Hrs 36 Hrs and 48 hrs.
- 11) Preparation of chick embryo Whole mounts.

SEMESTER VI THEORY PAPER 6.2

ECOLOGY, ZOOGEOGRAPHY AND WILD LIFE BIOLOGY		60 Hrs
A.	ECOLOGY:	40 hrs
1)	Introduction: Definition, History, Ecology spectrum – Subdivision of Ecology – Scope of Ecology.	02 hrs
2)	Abiotic factors: Light – effect of light on animals, Temperature – thermal stratification – effect of temperature on animals, Adaptations to extreme temperature.	05 hrs.
3)	Animal relationships – Mutualism, commensalism parasitism, ammensalism, predation and competition with relevant examples	05 hrs.
4)	Ecosystem: Components and Functions of Ecosystem. Natural ecosystems and man engineered ecosystem. Laws of thermodynamics. Energy flow in ecosystem, types of food chains with examples, Food web, ecological pyramids. Study of pond as Typical Ecosystem –Zonation, abiotic components and biotic components.	04hrs
5)	Community Ecology: Community structure, Ecological stratification – Ecotone& Edge effect.Ecological Niches.	05 hrs
6)	Habitat Ecology: Marine habitat: Physico-Chemical Feature, ecological zonation and classification of marine biota, Ecological adaptations to pelagic water and Deep Sea, Estuarine habitat: Physico-Chemical Features and Biota. Mangroves. Fresh water habitat: Physico-Chemical Features of Lentic and lotic water bodies. Ecological adaptations of fresh water animals living in Lotic Water bodies Terrestrial habitat – A brief account of biomes (Characteristics and fauna of Tundra, taiga, Grasslands, Savannas, chaparrals, Deciduas Forests and Deserts.). Faunal adaptations to Desert conditions	10 hrs
7)	Population Ecology: Population density, Natality and Mortality, age distribution, population growth rate, population growth curves. Biotic potential – Allee’s principle and Gause’s principle.	03hrs
8)	Environment pollution: Definition, Pollutants and types of Pollution- Air Pollution, Water Pollution, Soil Pollution – Sources, effect and control.	06 hrs
	Zoogeography and wild life Biology:	20 Hrs
9)	Zoogeographical realms :	06 Hrs

Zoogeographical realms (with subdivision) of world, with climatic conditions and examples of characteristic fauna – brief account of Wallace’s line.

10) Geographic distribution of animals: 04 Hrs

Continuous and discontinuous distributions with examples – Barriers of dispersal – topographic and vegetative barriers, large bodies of water as barriers climatic barriers.

11) .Wilde Life: 04 hrs

Definition, Wild life problems -Hunting, over harvesting, habitat loss, Pollution and Climate change.Importance of Wild Life Conservation and management. Ex-situ Conservation and In Situ Conservation

12) Distribution of wild life in India: 03 hrs

Wild life fauna in the Himalayan ranges, the peninsular Indian sub region, Deccan plateau, the Western Ghats, Eastern hill chain, the Indian desert, tropical rain forests, wild life in Andaman and Nicobar Islands.

13) Agencies engaged in wild life conservation: 03 hrs

Indian Board for Wildlife (IBWL), Wildlife Institute of India (WII), Central Zoo Authority of India (CZA), Bombay Natural History Society (BNHS), Project Tiger, Wild life (protection) Act 1972. World Wide Fund for Nature (WWF), Convention of international trade in endangered species of wild life flora and fauna. (CITES), Ramsar convention, Convention on Biological Diversity (CBD), Trade Record Analysis of Flora & Fauna in Commerce (TRAFFIC) IUCN- Red Data Book,

REFERENCE :-

- 1) Ananthakrishnan&Viswanathan, T.R. 1976. General Animal ecology. McMillan Co., India.
- 2) Purohit, S.S. 2004. Ecology & Environmental biology.Agrobios (India).
- 3) Purohit, S.S. &Agrawal, A.K. 2004. Environmental pollution: causes, effects and control.
- 4) Rastogi, V.B. &Jayaraj, M.S. Animal ecology and distribution of animals.
- 5) Sharma, P.D. 2000. Ecology and environment.Rastogi Publ.
- 6) Ecology By N.S. Subrahmanyamand AV SS Sambamurthy
- 7) Ecology Mohan P Arora
- 8) Text book of ecology – H.R. Singh.
- 9) Text book of ecology – P. Odum.
- 10) Principles of ecology – P.S. Verma and A.K. Agarwal.
- 11) Elements of animal Ecology Zoogeography – R. Nagabhushanam.
- 12) Fundamentals of Ecology – Sathguru Prasad
- 13) Animal ecology – W.H. Dowdeswell

- 14) Fundamentals of Ethology, Ecology and Biometry – Sathguru Prasad.
- 15) A text book of wild life – Sambashivayya
- 16) Agarwal, V.K. & Usha Gupta. S. Chand's simplified course in Ecology and Ethology.
- 17) Basra, G. 2004. Wildlife in India. 198 pages.
- 18) Boulenger, E.G., 2004. Wild animal life of the world.
- 19) Chadha, S.K., Conserving wildlife in India.
- 20) Dhyani, S.N., Wildlife Management. (BNHS, Mumbai).
- 21) Hosetti, B.B., 2003. Wildlife management in India.
- 22) Hosetti & Venkateshwarlu, M. 2001. Trends in wildlife biodiversity conservation and management. 2 vols.,
- 23) Khati, A.S., 2004. Indian national parks and sanctuaries: A living portrait of wild India.
- 24) Krishnan, M., The Handbook of India's wildlife (Maps & Agencies, Madras).
- 25) Prabhakar, V.K. (Ed.). 2001. Wildlife and applicable laws. 262 pages.
- 26) Ranga, M.M., 2002. Wildlife: Management and conservation. (Agrobios (India)).
- 27) Saharia, V.B., 1982. Wildlife in India. (Natraj Publ., DehraDun).
- 28) Salim Ali & Dillon Ripley, 1995. The pictorial guide to the birds of the Indian subcontinent.

SYLLABUS FOR PRACTICAL –ZP 6.2
BASED ON SEMESTER –VI ; PAPER Z-6.2
ECOLOGY, ZOOGEOGRAPHY AND WILD LIFE

A. Ecology:

1. Study of tropical pond as an ecosystem: Study of fauna and flora and interaction between the various constituents (Notes and figures).
2. Study of aquarium as an Ecosystem: Study of fauna and flora and interaction between various constituents (Notes and figures).
3. Study of community: By quadrant method to determine frequency, density and abundance of different species present in the community. Alpha diversity.
4. Estimation of dissolved Oxygen, Free CO₂, hardness of water and Chloride content.
5. Study of ecological adaptations and morphological peculiarities; Physalia, Jellyfish, Chaetopterus, Belanus, Hermit crab, Exocoetus, Synaptura, Phrynosoma, Draco, Chameleon and Bat.
6. Study of biotic relationship: Mutualism, Commensalism, Parasitism, Predation Two Examples for each,

B. Zoogeography and Wild life

7. Mapping of Zoogeographical Realms on World map and location Important fauna
8. Study of land biomes: Lakes, Deserts, Grassland, Forests on Indian and world map
9. Study of Biodiversity Hot Spots of India and World by using Maps
10. Location of tiger reserves, national parks, biosphere reserves, wild life sanctuaries on India map.
11. Study of threatened animals of India (By models/charts); tiger, lion, Elephant, one horned Rhinoceros, Gaur, Golden Langur, lion tailed monkey; musk deer, Mouse deer, Kashmir stag, Great Indian Hornbill, Indian Bustard and Indian rock python.
12. Study of Critically Endangered animals of India: By Using Charts
Himalayan Wolf- *Canis indica*: Namdapha Flying Squirrel -*Biswamoyopterus biswasi* Pygmy hog -
Porcupus salvania, Salim Ali's fruit bat -*Latidens salimalii*: The Wroughton's free-tailed bat -
Otomops wroughtoni, The Indian Vulture -*Gyps indicus*: Jerdon's Courser-*Rhinoptilus bitorquatus*: The
Ganges shark (*Glyptocheilus gangeticus*) The Malabar Large-spotted Civet (*Viverracivettina*), The Jenkin's
Shrew -*Crocidura jenkinsi*

13. Field oriented projects.

- a) Preparation of small inventory of important local wild animals (their classification, zoological name, common name, salient features etc).
- b) Study of Physico-chemical parameters and aquatic fauna for three months of any water body nearby college.
- c) Study of biodiversity in sacred grooves.
- d) Study of pollinators – Honeybees, butterflies and birds.
- e) Visit to national parks, wildlife sanctuaries, Crop Land, Wetland, Reserve Forest and an aquatic body to study the fauna and flora components (A report to be submitted).

KARNATAKA STATE WOMEN'S UNIVERSITY, BIJAPUR.

B.SC. DEGREE (SEMESTER) COURSE IN ZOOLOGY

SEMESTER V PAPER 5.1 AND 5.2

SEMESTER VI PAPER 6.1 AND 6.2

SCHEME OF QUESTION PAPER PATREN FOR THEORY

Effect from 2012-13 and onwards

Time: 3 Hrs

Max Marks: 80

Note: Answer must be specific to Question

Draw Neat labeled diagrams wherever necessary

I Answer any TEN of the following Questions. Very short answer type 10x2=20

1

2

3

4

5

6

7

8

9

10

11

12

II Answer any FOUR of the following Questions. Short answer type. 4x5=20

13

14

15

16

17

18

III Answer any FOUR of the following Questions. Essay Type.

4x10=40

19

20

21

22
23
24

FORMAT OF QUESTION PAPER FOR PRACTICAL ZP 6.1
BASED ON SEMISTER VI – PAPER Z. 6.1
CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY

Time 3 hrs

Max. Marks: 40

- | | | |
|--|---|---------|
| 1. | Preparation of one fixative and one stain | 04 |
| 2. | Identification of two cell organelles and one Stages from Cell division | 3x2= 06 |
| 3. | Squash preparation of onion root tip / grass hopper testis / flower bud of onion. | 08 |
| 4. | Identification of embryological slides. | 4x2=08 |
| (2 frog, 1 chick T.S) one whole mount of chick embryo | | |
| 5. | Mounting of chick embryo | 04 |
| 6. | Record book | 05 |
| 7. | Viva Voce | 05 |

FORMAT OF QUESTION PAPER FOR PRACTICAL –ZP 6.2
BASED ON SEMISTER – VI: PAPER - 6.2
ECOLOGY, ZOOGEOGRAPHY AND WILD LIFE.

Time 3 hrs Max. Marks: 40

- | | | |
|-----|--|--------|
| Q1. | Estimation of Oxygen/CO ₂ /chloride / Hardness | 08 |
| Q2. | Ecological adaptation: 3 Morphological + 3 biotic relations | 6x2=12 |
| Q3. | Spotting of 3 Endangered Species / Critically Endangered Species | 3x2=06 |
| Q4. | Mapping of Zoogeographical Realm/Terrestrial Biomes/and Food chains. | 2x2=04 |
| Q5. | Record book | 05 |
| Q6. | Project Report. | 05 |