TUMKUR UNIVERSITY

B.Sc. Programme: Course Structure & Matrix for Semester I, II, III & IV in Zoology – CBCS

Sl. No.	Course Number in Semester I/II/III/IV	Subject, Paper No. and Title in a Semester I/II/III/IV	Type of Instruction and hours per week/ Course	Credits	Hours of Exam (SEE) per Course/ Sem.	Maxi. Marks for I.A/ Course/ Sem.	Maxi. Marks for SEE per Course/ Sem.	Maxi. Marks per Course Sem.
1	1.7-I Sem.	Paper No.-I Animal Diversity	T 4	4	3	10	90	100
2	1.8-I Sem.	Practical No-I Based on 1.7 Theory	P 4	2	3	-	50	50
3	2.7-II Sem.	Paper No.-II Comparative Anatomy And Developmental Biology of Vertebrates	T 4	4	3	10	90	100
4	2.8-II Sem.	Practical No.-II Based on 2.7 Theory	P 4	2	3	-	50	50
5	3.7-III Sem.	Paper No.-III Physiology and Human Anatomy	T 4	4	3	10	90	100
6	3.8-III Sem.	Practical No.-III Based on 3.7 Theory	P 4	2	3	-	50	50
7	4.7-IV Sem.	Paper No.-IV Insects Vectors and Diseases	T 4	4	3	10	90	100
8	4.8-IV Sem.	Practical No.-IV Based on 4.7 Theory	P 4	2	3	-	50	50
Group III Compulsory Courses and open elective (Mandatory for the combination of B.Sc. Programme not to be considered for declaration of class and rank)								
	8 Courses / Semesters (4T &4 P)	**8 Courses for four Semesters (4T &4 P)**	**32 Hours / Week**	**24**	**24**	**40**	**560**	**600**
9	4.9- IV Sem.	Open Elective Paper Apiculture	2 T	2	3	-	50	50

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TUMKUR UNIVERSITY

B.Sc. Programme: Course Structure & Matrix for semester V&VI in Zoology – CBCS

Sl. No.	Course Number* in Sem. V/VI	Subject, Paper No. and Title in a Semester V/VI	Type of Instruction and hours Per week/Type	Credits	Hours of Exam (SEE) per Course/ Sem.	Maxi. Marks for I.A/ Course/ Sem.	Maxi. Marks for SEE per Course / Sem.	Maxi. Marks per Course Sem.
10	5.7-V Sem.	Paper No.- V Genetics and Evolutionary Biology	T 3	3	3	10	90	100
11	5.8 –V Sem.	Paper No.VI- Cell Biology and Immunology	T 3	3	3	10	90	100
12	5.9A-V Sem.	Practical No.- V Based on 5.7 Theory	P 3	3	3	-	50	50
13	5.9B-V Sem.	Practical No.-VI Based on 5.8 Theory	P 3		3	-	50	50
14	6.7- VI Sem.	Paper No. -VII Applied Zoology	T 3	4	3	10	90	100
15	6.8- VI Sem.	Paper No.-VIII Environmental Biology and Ethology	T 3	4	3	10	90	100
16	6.9A-VI Sem.	Practical No. -VII Based on 6.7 Theory	P 3	3	3	-	50	50
17	6.9B- VI Sem.	Practical No.-VIII Based on 6.8 Theory	P 3		3	-	50	50
		8 Courses for VI & VII Sem. (4T &4P)	**24 Hours / Week**	**20**	**24**	**40**	**560**	**600**
Total		**16 Courses for I / II/III/IV/V/VI Sem.(excluding OET Paper) (8T &8P)**	**56 Hours / Week**	**44**	**48**	**80**	**1120**	**1200**

I SEMESTER ZOOLOGY
1.7:PAPER- I, ANIMAL DIVIERSITY

CREDITS-4
60 HOURS

Unit:1PHYLUM: PROTOZOA **04 Hrs**
1 General characters and classification up to classes of Protozoa with suitable examples. 02Hrs
2 Locomotory organelles in Protozoa: Pseudopodia, Flagella and Cilia.
Locomotion in Protozoa: Amoeboid movement, Flagellar movement, Ciliary movement. 02 Hrs

Unit:2 PHYLUM: PORIFERA **03 Hrs**
1 General characters and classification up to classes with suitable examples. 02Hrs
2 Canal system in Sycon. 01Hr

Unit:3 PHYLUM: COELENTERATA **03Hrs**
1 General characters and classification up to classes with suitable examples. 01Hr
2 Polymorphism in Halistemma and Physalia 02Hrs

Unit:4 PHYLUM: PLATYHELMINTHES **03Hrs**
1 General characters and classification up to classes with suitable examples. 01Hr
2 Life History of Taenia solium 02Hrs

Unit:5 PHYLUM:NEMATHELMINTHES **03 Hrs**
1 General characters of Nematoda with examples 01Hrs
2 Structure (Sexual dimorphism) and life history of Ascaris lumbricoides and its parasitic adaptations 02Hrs

Unit: 6 PHYLUM: ANNELIDA **04 Hrs**
1 General characters and classification up to classes with suitable examples 02Hrs
2 Coelom and Metamerism in Annelids with their significances 02Hrs

Unit: 7 PHYLUM: ARTHROPODA **06Hrs**
1 General characters and classification up to classes with suitable examples. 02Hrs
2 Vision in Arthropoda :Compound eye in Palaemon (Mosaic Vision) and Simple eye in Scorpion 02Hrs
3 Metamorphosis in Insects(Ametabola, Hemimetabola,Paurometabola, Hypermetabola and Holometabola) 02Hrs

Unit:8 PHYLUM: MOLLUSCA **03Hrs**
1General characters and classification up to classes with suitable examples. 02Hrs
2 Pearl culture and Mytilus culture 01Hr

Unit:9:PHYLUM: ECHINODERMATA **03Hrs**
1 General characters and classification up to classes with suitable example 02Hrs
2 Water Vascular system in Asterias 01Hr

Unit:10: PROTOCHORDATA **03Hrs**
1General characters of Protochordata 01Hr
2 Structure and Retrogressive Metamorphosis in Ascidia 02 Hrs

Unit:11:AGNATHA **02Hrs**
1 General characters and its classification up to classes with suitable examples. 01Hr
2 Differences between Hag fishes and Lampreys. 01Hr

Unit:12: PISCES **06Hrs**
1 General characters of Pisces, Chondrichthyes, Osteichthyes and Dipnoi. 02Hrs
2 Shark externals, Digestive system and Circulatory system(Arterial and Venous system) 04Hrs

Unit:13: AMPHIBIA **03Hrs**
1 General characters and classification up to orders 01Hr
2 Frog: Externals and Respiratory system. 02Hrs

Unit:14: REPTILES **04Hrs**
1 General characters and classification up to living orders 02Hrs
2 Poisonous apparatus, Composition of Venom and its effects and Biting mechanism in Snakes 02Hrs

Unit: 15: AVES **04Hrs**

1 General characters of Birds, Interesting features of Ratitae and Carinate 02Hrs

2 Flight adaptations(Morphological and Anatomical flight adaptations) 02Hrs

Unit:16: MAMMALS **06Hrs**

1 Characters of Prototheria, Metatheria and Eutheria 02Hrs

2 Interesting features of Chiroptera, Cetacea, Proboscidea and Primates 04Hrs

SUGGESTED READINGS

- Invertebrate Zoology: E.L. Jordan and Verma
- Modern text book of Zoology-Invertebrates: R.L. Kotpal
- Biology of Animals Vol 1 Ganguly,Sinha and Adhikari
- Zoology for Degree students: Dr V.K. Agarwal.
- Modern text book of Zoology: Vertebrates: R.L.Kotpal.

I SEMESTER PRACTICAL-1(1.8)
BASED ON ANIMAL DIVIERSITY

CREDITS-2 15 Units

1 PHYLUM: PROTOZOA
Observation of water samples for the live Protozoan, Study of Amoeba, Euglena and Paramecium.

2 PHYLUM: PORIFERA
Sycon, Euplectella and Spongilla.

3 PHYLUM: COELENTERATA
Obelia, Physalia, Aurelia and Fungia.

Whole mount preparation of Coelenterate colony (Obelia or Sertularia colony).

4 PHYLUM: : PLATYHELMINTHES AND NEMATHELMINTHES
Taenia solium, Male and Female Ascaris lumbricoides, T.S. of Male and Female Ascaris.

5PHYLUM: ANNELIDA
Earth worm, Nereis and Leech.

6 PHYLUM: ARTHROPODA
Peripatus, Palaemon, Limulus, Centipede, Millepede and Spider.

7 PHYLUM: MOLLUSCA
Chiton, Octopus, Shells of Dentalium, Pila and Sepia.

8 PHYLUM: ECHINODERMATA
Asterias, Brittle star, Sea Urchin, Cucumeria, Antedon and Bipinnaria larva.

9 PROTOCHORDATA AND CYCLOSTOMATA
Balanoglossus, Ascidia, Amphioxus and Petromyzon.

10PISCES
Pristis, Hippocampus, Exocoetus and Anguilla.

11AMPHIBIA
Ichthyophis, Salamander and Hyla.

12 REPTILES
Chelone, Chameleon, Draco, Varanus or Crocodile.

13 AVES/BIRDS
Beak and Feet modifications in Crow, Pigeon, Parrot and Duck.

14 MAMMALS

Bat, Funambulus, Loris, Pangolin and Hedgehog.

15: Identification of Poisonous and Non-poisonous (Cobra/Viper and Python or Rat Snake or Natrix)

16 Preparation of Animal album containing photographs with information about Taxonomy, Habit, Habitat and Characters. Different animals may be given to different sets of students(Five from invertebrates and Five from Vertebrates. Except the photographs rest of the information to be hand written).

Note: Photographs, Charts and Models can be used.

I SEMESTER ZOOLOGY
PRACTICAL-1(1.8)
BASED ON ANIMAL DIVIERSITY
SCHEME OF VALUATIONS

Durations:3Hrs Max .Marks 50

Q 1 Identify and Comment on A to E 5 Specimens x 3= 15 Marks
(Protozoa to Echinodermata)

Q 2 Identify and Comment on F to H 3 Specimens x 3= 09 Marks
(Protochordata to Mammals)

Q3 Identification of Poisonous and Non poisonous snakes 05 Marks

Q4 Whole mount preparation of Coelenterate colony (Obelia or Sertularia colony)

06 Marks

Q5 Submission of Animal album 05 Marks

Q6 Viva-Voce 05 Marks
(Ascaris, Peripatus, Hippocampus, Beak and Feet Modification in Crow, Pigeon, Parrot and Duck. Bat. ONLY FIVE QUESTIONS)

Q 7 Class records 05 Marks

II SEMESTER ZOOLOGY

2.7 PAPER II- COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES

CREDITS 4 60 Hours

Unit: I Integumentary system 6Hrs

1.1 **Integument and its modifications in Chordates:**

Epidermal derivatives: Mucous gland, Poison gland, Luminescent gland, Femoral gland, Uropygial gland, Sweat (Sudoriferous gland), Sebaceous gland, Ceurminous gland, Meibomian gland, Scent gland, Mammary gland.

Dermal derivatives: Scales in fishes, Fin ray in fishes, Bony scutes in Crocodile, Carapace and Plastron in Turtle and Tortoise, Dermal scale in Mammal and Antler in Mammal.

Digital tips: Claw, Nail and Hoof 3hrs

1.2 Comparison of integument in vertebrate series Pisces(Shark), Amphibian(Frog), Reptile(Lizard), Aves(Pigeon) and Mammals (Rabbit) 3hrs

Unit: II The Skeletal system 6hrs

2.0 Trace the Evolution of Visceral arches in Vertebrate series 2hrs

2.1 Comparative account of the pectoral and pelvic girdle of (Amphibian-Frog, Aves-Pigeon and Mammal-Rabbit) 4hrs

Unit III Digestive System 6hrs

3.0 Comparative account of Digestive glands- Pancreas and Liver in different vertebrates (Fish to Mammal) 02hrs

3.1 Comparative account of alimentary canal of Vertebrates (Amphibian-Frog, Aves-Pigeon and Mammal-Rabbit) 4hrs

Unit: IV Respiratory System 4hrs

4.0 Comparative account of respiratory system of vertebrates(Amphibian-Frog, Aves-Pigeon and Mammal-Rabbit)

Unit V Circulatory System 4hrs

5.0 Evolutionary trends in the heart and aortic arches in vertebrate series(Fish to Mammal)

Unit: VI Excretory system 3hrs

6.0 Succession of Kidney: Archinephros, Pronephros, Opisthonephros, Mesonephros and Metanephros.

Unit: VII Nervous system 5hrs

7.0 Comparative account of brain of Shark, Frog, Lizard, Pigeon and Rabbit 03hrs

7.1 Types of receptors -Tango receptors, Gusto receptors, Olfacto receptors and Stato receptors 02hrs

Unit: VIII Early Embryonic development 14hrs

8.0 Gametogenesis: Spermatogenesis and Oogenesis with reference to Mammals 02hrs

8.1 Mechanism of Fertilization- External fertilization (Amphibians),Internal fertilization(Mammals) 04hrs

8.2 Structure of Mature egg in Frog and Chick 02hr

8.3 Patterns of Cleavage, Fate map of Frog and Chick 02hrs

8.4 Comparative account of Blastula in Frog and Chick 01hr

8.5 Gastrulation in Frog and Chick 02hrs

8.6 Neurulation in Frog embryo 01hr

Unit: IX Late embryonic development 12hrs

9.0 Implantation of embryo and hormonal control in Humans 03hrs

9.1 Formation of Human placenta and its functions 02hrs

9.2 Basic types of placenta: Yolk sac placenta, Allantois, Deciduate and Non deciduate. Types of placenta on the basis of Histology. 04hrs

9.3 Metamorphic events in Frog life cycle 02hrs

9.4Hormonal control of Amphibian metamorphosis 01hr

Suggested Readings:

- Kardong .K.V(2005) Vertebrates Comparative Anatomy, Function and Evolution- IV Edition. McGraw Hill Higher Education.
- Kent. G.C. and Carr R.K.(2000) Comparative Anatomy of the Vertebrates. IX Edition. McGraw Hill Companies.
- Hildebrand. M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons
- Walter.H.E and Sayles.L.P. Biology of Vertebrates, Khosla Publishing house
- Gilbert.S.F.(2006).Developmental Biology, VIII Edition, Sinauer Associate, Inc Publishers, Sunderland, Massachusetts, USA.
- Balinsky.B.I. (2008) An Introduction to Embryology, International Thomson Computer Press.
- Carlson Bruce. M. (1996) Patten's Foundation of Embryology, McGraw Hill,Inc
- E.L.Jordan and Dr.P.S.Verma, Chordate Zoology Revised and Enlarged Edition. S.Chand.
- Sastry and Shukal, Developmental Biology. Rastogi Publications
- A.K.Berry. An Introduction to Embryology, Emkay Publications, Delhi.

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II SEMESTER PRACTICAL-II (2.8)
BASED ON COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATESs
CREDITS 2 15 Units

1 Comparative anatomy

a) Section of Skin of Shark, Amphibian(Frog) and Mammal.

b) Hearts of Shark, Amphibian(Frog), Aves(Pigeon) and Mammal (Rabbit/Rat).

c) Brains of Shark, Amphibian(Frog), Aves(Pigeon) and Mammal (Rabbit/Rat).

d) Pectoral and pelvic girdles of Amphibian(Frog), Aves (Pigeon) and Mammal (Rabbit/Rat).

2 Developmental Biology(Frog Embryology) Slides

Permanent slides: Cleavage, Blastula, Gastrula, Neurula, Tail bud stage, Tadpole external gill stage, Tadpole internal gill stage.

3 Developmental Biology(Placental slides or Photographs)

A) Epithelio- Chorial placenta.

B) Syndesmo- Chorial placenta.

C) Endothelio- Chorial placenta.

D) Haemo- Chorial placenta.

E) Haemo-Endothelial placenta.

4 Museum specimens of Vertebrate embryos/ Slides of different stages of Chick Embryo

(18 hrs,24hrs,36hrs,48hrs and 72 hrs whole mount stages)

5 Whole mount preparations of Fish scale- Placoid / Ctenoid / Cycloid scales.

6 Viva -Voce (Based on practical II)

(Skin of Mammal, Cleavages of Frog, Hearts of Shark and Amphibian, Placenta, 24 hrs and 36 hrs Chick embryo)

II SEMESTER PRACTICAL-II (2.8)

BASED ON COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES:

SCHEME OF EXAMINATION

DURATION: 3 hrs **Max.Marks 50**

Q 1 Comparative Anatomy:

A) Compare and Comment on A and B 06 Marks
(Any two comparison from section 1-a, b and c)

B) Compare and Comment on Pectoral girdle of Amphibian, Aves and Mammal 05 Marks
C) Compare and Comment on Pelvic girdle of Amphibian, Aves and Mammal 05 Marks

Q 2 Developmental Biology (Frog Embryology) 2 Slides 2X3=06Marks

Q 3 Developmental Biology(Placental slides or Photographs) 2x3=06 Marks

Q 4 Vertebrate embryos or Permanent slides of Chick any two 2x4=08 Marks

Q 5 Whole Mount preparation (Any one) 04 Marks
(Fish scale- Placoid / Ctenoid / Cycloid- scales)

Q 6 Viva-Voce (Concern to Practical Syllabus mentioned in section 6, Only five questions) 05 Marks

Q7 Class Records 05 Marks

(Note: Charts, Photographs and Model can be shown)

III SEMESTER ZOOLOGY
3.7 PAPER III PHYSIOLOGY AND HUMAN ANATOMY

4 CREDITS **60 Hours**

Unit:1 Homeostasis: Maintenance of constant internal environment and role of feedback mechanisms. **01hr**

Unit:2 Digestion: **04 Hrs**

Control of digestive secretions, Physiology of Absorption of Carbohydrates, Proteins, Lipids. Common gastro-intestinal disorders in man: Hyper acidity, Ulcer, Cirrhosis, Hepatitis and Endoscopy.

Unit:3 Respiration **05 Hrs**

Pulmonary ventilation, Vital capacity and respiratory volumes, Transport of oxygen and carbon dioxide in blood. Respiratory pigments, Disorders- Carbon monoxide poisoning, Effect of Smoking and Silicosis.

Unit:4 Excretion and Osmoregulation: **06Hrs**

Ammonotelism, Uriotelism and Uricotelism. Formation of Ammonia, Urea and Uric acid. Composition of Normal urine. Disorders-Nephritis, Ketosis and Dialysis. Ionic balance in Artemia Salina, Water balance in Turtle, Camel and Man.

Unit:5 Cardiovascular System: **06Hrs**

Composition of Blood, Hemostasis, Origin and conduction of the cardiac impulse, Cardiac cycle,
Disorders-Coronary thrombosis, Angina pectoris, Anemia, Leukemia, Cerebral hemorrhage, Angioplasty and Bypass surgery. Lymphatic system.

Unit:6 Nervous system **04Hrs**

Structure of Neuron, Resting membrane potential, Graded potential, Origin of action potential and its propagation in Myelinated and Non myelinated fibres.

Unit:7 Muscle physiology **04Hrs**

Ultra structure of Skeletal muscle, Chemical composition, Physico-chemical changes during muscle contraction and Sliding filament theory.

Unit:9 Endocrine glands **06Hrs**

Hormonal control of Spermatogenesis, Hormonal control of Menstrual cycle and its regulation.
Microscopic anatomy: Structure and function of Pituitary gland, Thyroid, Pancreas and Adrenal gland.

Unit:10 Human Anatomy:

10.0 Unique features of Humans **8hrs**
10.1 Skeletal System: Axial and Appendicular Skeleton except the bones of hand and foot.
10.2 A detailed account of Digestive system including Oral cavity. **3hrs**
10.3 Circulatory system: Gross anatomy of Heart, Arterial system and Venous system. **3hrs**
10.4 Respiratory system. **2hrs**
10.5 Excretory system. **2hrs**
10.5 Male and Female reproductive system. **2hrs**
10.6 Gross structure of Brain and Spinal cord, Sense organs- Eye and Ear. **4hrs**

Suggested Readings:

Tortora.G.J and Derrickson.B.H.(2009) Principals of Anatomy and Physiology XII Edition, John Wiley and Sons, Inc

Widmaier.E.P, Raff. H and Strang K.T.2008 Vander's Human Physiology.

Guyton.A.C. and Hall.J.E.2011 Text book of Medical physiology XII Edition, Harcourt Asia Pvt. Ltd

S.C.Rastogi. Essentials of Animal Physiology. New Age International Publishers. New Delhi

Ross and Wilson Anatomy in Health and Illness, XII Edition,Elsevier Health-UK

P.R.Ashalatha. Text book of Anatomy and Physiology for Nurses with free practice book, Jaypee Brothers.

Mohan.P.Arora: Animal physiology, Himalayan publishing house.

Evelyn C. Pearce: Anatomy and Physiology for Nurses, 16 Edition, Oxford University Press.

III SEMESTER
PRACTICAL -III (3.8)
BASED ON PHYSIOLOGY AND HUMAN ANATOMY

CREDITS 2 15 Units

1 Nitrogenous wastes-Tests for Ammonia, Urea and Uric acid.

2 Organic constituents of Protoplasm-Tests for Glucose, Sucrose, Starch and Proteins.

3 Detection of abnormal Excretion of Sugar, Albumin, Ketone and creatinine urine.

4 Study of permanent Microscopic anatomy of Mammalian Pituitary, Thyroid, Pancreas and Adrenal gland.

5 Study of permanent Microscopic anatomy of Stomach, Small intestine, Liver, Kidney, Testis and Ovary.

6 Human Skeletal System: Axial and Appendicular Skeleton except the bones of hand and foot.

Q 7 Preparation and submission of Any Model pertaining to Human Anatomy.

III SEMESTER PRACTICAL-III (3.8)
BASED ON PHYSIOLOGY AND HUMAN ANATOMY

SCHEME OF VALUATION

DURATION 3 Hours **MAX.MARKS=50**

Q 1: Physiological experiments (any one of the experiments from 1to 3).	12 Marks
Q 2: Microscopic anatomy 2+2 slides (from4 and 5).	4x4=16Marks
Q3: Human Skeletal system (1 from Axial + 1 from Appendicular Skeleton).	2x4=08 Marks
Q4: Submission of Model pertaining to Human Anatomy.	04 Marks
Q5: Viva-Voce (2 Questions from Physiology experiments+2 Questions from Human skeleton +1 Question microscopic anatomy).	05 Marks
Q6: Class Records:	05 Marks

IV SEMESTER ZOOLOGY

4.7:-PAPER IV - INSECT VECTORS AND DISEASES

CREDITS- 4, 60 Hours

Unit I: Introduction to Insects

Introduction to Entomology, Morphology of Head and Eyes of insects, Trophi of insects- Cockroach, Mosquito (male and female), Housefly, Honeybee and Butterfly with reference to feeding habits. **06hrs**

Unit II: Concept of Vectors **06hrs**

Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Adaptations of vectors, Host Specificity.

Unit III: Insects as Vectors 08hrs

General characters and classification of insects up to orders, detailed features of insects, orders as vectors- Diptera, Siphonaptera, Siphunculata, Hemiptera.

Unit IV: Dipteran as Disease Vectors 24hrs

Dipterans as important insect vectors-Mosquitoes, Sand fly, Houseflies.

Study of Mosquito-borne diseases-Malaria, Dengue, Chikungunya, Filariasis with respect Control of mosquitoes.

Sand fly-borne diseases - Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever, Control of Sand fly.

Study of House fly as important mechanical vector and Control of house fly.

Unit VI: Siphonaptera as Disease Vectors 06hrs

Fleas as important insect vectors: Host-specificity, Study of Flea-borne diseases - Plague, Control of fleas.

Unit VII: Siphunculata as Disease Vectors 06hrs

Human louse (Head and Body louse) as important insect vectors: Study of louse-borne diseases-Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis, control of Human louse.

Unit VIII: Hemiptera as Disease Vectors 04hrs

Bugs as insect vectors: Blood-sucking bugs, Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures.

SUGGESTED READINGS:

- Imms, A.D. (1977). A General Text Book of Entomology. Champan & Hall, UK.
- Chapman, R.R (1998). *The Insects: Structure and Function. IV Edition,* Cambridge University Press, UK.
- Pedigo L.P. (2002). *Entomology and Pest Management.* Prentice Hall Publication.
- Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases.* Wiley-Blackwell.

IV SEMESTER PRACTICAL-IV (4.8)

BASED ON INSECT VECTORS AND DISEASES

CREDITS -2

15Units

1. Study of different kinds of mouth parts of insects (Cockroach, Mosquito (male and female), Housefly, Honeybee and Butterfly).

2. Study of following insect vectors through permanent slides /photographs:

   Aedes, Culex, Anopheles, Pediculus humanus capitis. Pediculus humanus corporis, Phithirus pubis. Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica, through permanent slides/photographs.

3. Study of different diseases transmitted by above Insect vectors.

Submission of a project report on any one of the Insect vectors and Disease transmitted.

(Note: Except the photographs rest of the information to be hand written)

IV SEMESTER ZOOLOGY

PRACTICAL –IV (4.8) BASED ON INSECT VECTORS AND DISEASES SCHEME OF EXAMINATION

Duration: 3 hrs. **Max. Marks: 50**

Q 1. Identify and comment on A and B

(Two insects mouth parts (trophi)-slides/photograph (2x5) = 10 marks

Q 2. Identify, Classify, Comment and diseases transmitted by

Insect vectors any four (4x5) = 20 marks

Q 3. Submission of project report on any one of the Insect vectors and Diseases Transmission. Except the photographs rest of the information to be hand written)

10 marks

Q 4 Viva -Voce (based on practical 2 specified in the syllabus): 05 marks

Q 5 Practical records: 05 marks

IV SEMESTER ZOOLOGY
4.9 OPEN ELECTIVE PAPER
APICULTURE 2 CREDITS 25hrs

Unit: 1 Biology of Bees 04Hrs

History, Classification and Biology of Honey Bees, Social Organization of Bee Colony.

Unit: 2 Rearing of Bees 10 Hrs

Artificial Bee rearing(Apiray), Beehives-Newton and Langstroth, Bee Pasturage. Selection of Bee species for Apiculture, Bee keeping equipment. Methods of Extraction of Honey(Indigenous and Modern)

Unit: 3 Diseases and Enemies 05 Hrs

Bee Diseases and Enemies, Control and Preventive measures

Unit: 4 Bee Economy 02 Hrs

Products of Apiculture Industry and its Uses(Honey, Bee wax)

Unit: 5 Entrepreneurship in Apiculture 04 Hrs

Bee keeping Industry-Recent efforts, Modern methods in employing artificial Beehives for cross pollination in Horticulture gardens.

SUGGETED READINGS:

- Prost. P.J. 1962: Apiculture Oxford and IBH, New Delhi.
- Bisht. D.S. Apiculture, ICAR Publication.
- Singh.S. Beekeeping in India, Indian Council of Agriculture Research, New Delhi.

V SEMSETER ZOOLOGY
5.7 PAPER V GENETICS AND EVOLUTIONARY BIOLOGY
CREDITS 3, 45 Hours

Unit: I Introduction to Genetics **02Hours**

Mendel's work on transmission of traits, Genetic variations, Molecular basis of genetic information

Unit: II Mendelian Genetics and its Extension **08Hours**

Principles of inheritance, Chromosomal theory of inheritance ,Incomplete dominance and co-dominance. Interaction of genes(Comb shape in Poultry). Epistasis-Dominant and recessive , Multiple alleles-ABO and Rh alleles, Rh incompatibility in humans. Lethal alleles, Sex-linked inheritance- Eye colour in Drosophila, Haemophilia, Colour blindness man.

Unit:III Linkage,Crossing over and Chromosomal Mapping **04Hours**

Linkage and crossing over, Chromosomal mapping, Somatic cell genetics and its applications.

Unit: IV Mutations **05Hours**

Chromosomal Mutations , Duplication, Inversion, Translocation, Aneuploidy and Polyploidy.

Gene mutations: Induced and Spontaneous mutations, Back and Supressor mutations.

Unit: V Sex determination **04Hours**

Chromosomal Mechanism-XX-0X,XX-XY,ZZ-ZW types, Genic balance theory of Bridges, Dosage compensation in Man

Unit: VI Origin of Life **03Hours**

Genesis theory, Cosmozoic theory, Abiogenesis theory, Biogenesis theory. Theory of chemical evolution of life. Stanley Miller's experiment.

Unit: VII Introduction to Evolutionary Theories **04Hours**

Lamarckism, Darwinism and Neo-Darwinism

Unit: VIII Direct Evidences of Organic Evolution **06Hours**

Evidences from Homologous and Analogous organs. Embryological evidences. Serological evidences. Evidences from vestigial organs. Serial Homology.

Paleontological evidences, Formation of fossil, Types of fossil, Dating of fossil Carbon 14, Potassium-Argon, Uranium-Lead method. Significance of fossils. Geological time scale and its significance.

Unit: IX Isolation: **02Hours**

Isolation, Isolating Mechanism- Prezygotic and Postzygotic. Role of isolation

Unit: X Evolution of Man: **02Hours**

Trends in Evolution of Man. Ramapithecus, Australopithecus, Pithecanthropus erectus, Pithecanthropus pekinesis, Neanderthal man and Cromagnon man.

Unit: XI Evolution of Horse: **02Hours**

Trends in Evolution of Horse. Hyracotherium, Mesohippus, Merychippus, Pliohippus and Equus.

Unit: XII Animal distribution and Zoogeography **03Hours**

Classification and patterns of Animal distribution, Reasons for Discontinuous distribution, Continental drift hypothesis, Dispersal and Barrier.

Zoogeographical realms and their fauna.

SUGGESTED READINGS

- Gardner, E.J.Simmons, M.J. Snustad, D.P (2008). **Principles of Genetics**. VIII Edition. Wiley India
- Snustad D.P. Simmons, M.J (2009). **Principles of Genetics** Edition. John Wiley and sons Inc.
- Klug.W.S. CummingM.R. Spencer C.A.(2012).**Concepts of Genetics** X Edition. Benjamin Cummings.
- Russell, P.J. (2009) **Genetics-A Molecular Approach**.III Edition. Benjamin Cumming.
- Griffiths A.J.F. Wessler S.R. Lewontin R.C. and Carrol S.B. **Introduction to Genetic Analysis.** IX Edition. W.H.Freeman and Co.
- Ridiey M. (2004) **Evolution**. III Edition. Blackwell Publishing
- Barton.N.H. Briggs, D.E.G. Eisen J.A. Goldstein D.B. and N.H. (2007). **Evolution.** Cold Spring, Harbour Laboratory Press.
- Hall B.K. and Hallgrimsson B.(2008) **Evolution.** IV Edition Jones and Bartlett Publishers
- Campbell N.A. and Reece J.B. (2011**) Biology**.IX Edition, Pearson, Benjamin, Cummings.
- Douglas,J.Futuyma91997)**Evolutionary Biology**. Sinauer Associates
- Organic Evolution by Veer Bala Rastogi
- Human Genetics by Mange and Manage
- Principles of Genetics by Robert .H. Tamarin Tata McGraw-Hill pub.
- Genetics by P.K.Gupta.
- Genetics by Veer BAL Rastogi.

5.8 PAPER VI- CELL BIOLOGY AND IMMUNOLOGY

3 CREDITS 45Hours

Unit 1 4 Hours

Microscopy: Principles of Light microscope, Resolving power, Phase contrast microscope, Electron microscope, Comparison of Light and Electron microscope.
Centrifuge: Principles, Structure of centrifuge and applications of centrifugation.

Unit 2 7 Hours

Plasma membrane: Fluid mosaic model (Singer and Nicholson 1972), chemical composition of plasma membrane.
Cell-Cell interactions: Microvillus, Tight junction, Desmosome and Gap junction.
Functions of Plasma membrane: Exocytosis, Endocytosis, Phagocytosis and Pinocytosis.
Cell organelles: Structure and functions of Centrosome, Mitochondrion, Golgi complex and Nucleus.

Unit 3 3Hours
Giant chromosomes: Polytene chromosome, Lamp brush chromosome and Super numerary chromosomes.

Unit 4 2 Hours

Parthenogenesis: Natural parthenogenesis, Artificial parthenogenesis and significance.

Unit 5 1 Hour

Aging: Causes of aging, changes occurring during aging and Telomere and aging.

Unit 6 2Hour

Stem cells: Types, Properties of stem cells, embryonic stem cells culture and applications of stem cells. Organ culture.

Unit 7

Biology of Cancer: 6 Hours

Introduction, Malignant and Non malignant tumour, Metastasis, Carcinogen, General properties of cancerous cells, Structural and Metabolic variations of cancerous cells, Symptoms of cancer, Treatment: Surgical, Chemotherapy and Gene therapy. Preventive measures of cancer.

Unit 8 2Hours

Applications of immunology in Medicine, Microbiology, Blood group typing , Tissue organ transplantation.

Unit 9

Cells involved in Immune response: 3Hours

Lymphocytes, T lymphocyte, B lymphocyte, NK cell, K cell, Macrophage, Dendric cells, Eosinophil, Basophil, Neutrophil, Antigen presenting cell and Mast cell.

Unit 10 3Hours

Antigens: Structure and function of Antigen, types of antigens, exogenous, endogenous, Thymus independent and Thymus dependent antigen.

Unit 11

Immunity: Innate immunity and Acquired immunity. 2 Hours

Unit12

Immune response: Antibody mediated immune response and Cell mediated Immune response.

Unit13 3 Hours

Lymphoid organs: Primary lymphoid organs (Thymus, Bursa fabricus in birds, Bone marrow in mammals). Secondary lymphoid organs(Lymph node, Spleen and Tonsils).

Unit 14

AIDS: 2 Hours

Introduction, Structure of HIV, Mode of infection, preventive measures and HIV test- ELISA and Western blot.

Unit15 2 Hours

Production of Monoclonal antibodies and its applications. Polyclonal antibodies.

UNIT 16

Transplantation and Plastic surgery: 3Hours

Transplantation, Types of Graft, Brief account of organ transplantation. Immuno-suppressors, Cornea grafting. Plastic surgery .

SUGGESTED READING:

1)C.D. Power ,Cell Biology vol 1:

2) P.S. Verma and V.K. Agarwal: Cell Biology,Genetics,Molecular Biology, Evolution and Ecology. S.Chand.

3) Tomer: Cell Biology

4) Satyesh Chandra Roy and Kalyan Kumar.D.E.- Cell Biology.

5)V.Kumaresan: Biotechnology, Saras publication

6)Dulsy Fathima and N. Arumugam- Immunology, Saras publication

7) Seemi Farhat Basir. Immunology. PHI Learning Private Limited, New Delhi

8) Gerald Karp: Cell Biology

9) Gerald Karp: Cell and Molecular Biology

10) P.K. Gupta : Cell and Molecular Biology Rastogi Publication

V SEMESTER PRACTICALS-V (5.9 A)
BASED ON GENETICS AND EVOLUTIONARY BIOLOGY

CREDITS-2 15 Units

1 Study of Mendelian inheritance(Monohybrid and Dihybrid crosses -4 problems
Gene interactions(Blood groups, Sex linked inheritance) -4 problems

2 Drosophila Genetics :a)Male and Female Identification b) Syndrome Identification

3 Study of Human Karyotypes: Normal and Abnormal(Turner's, Klinefelter's, Down's and Cri-du-Chat syndrome)

4 Study of a) Homologous organs b) Analogous organs with suitable specimens/pictures
a) Mouthparts of cockroach and Female mosquitoe
b) Wing of Bird, Wing of Insect and Patagium of Bat

5 Study of Vestigial organs from suitable Specimens/Pictures.
(Vermiform appendix, Wisdom tooth and Coccyx)

6 Study of Fossil evidences from suitable Specimens/Pictures:
Ichthyosaurus, Brontosaurus, Stegosaurus and Archaeopteryx

7 Charts:
a) Identification and comment on fossil records of Man- Pictures
Ramapithecus, Australopithecus, Pithecanthropus erectus, Pithecanthropus pekinesis, Neanderthal man and Cromagnon man.(Any three)

b) Identification and comment on fossil records of Horse- Pictures
Hyracotherium,Mesohippus,Merychippus,Pliohippus and Equus.(Any three)

8 Submission on Project report on 1) Evolution of Elephant. 2) Evolution of Camel
3) DNA Finger printing or Human Genome Project
4) Application of Genetic engineering in Agriculture, Pharmaceuticals and Food technology
5) Dinosaurs 6) Fossils

(Note: Except the photographs rest of the information to be hand written)

V SEMESTER PRACTICALS-V (5.9 A)
BASED ON GENETICS AND EVOLUTIONARY BIOLOGY
SCHEME OF EXAMINATION

DURATION:3 Hours **MAX.MARKS:50**

Q 1. Problems on a) Monohybrid or Dihybrid crosses (one problem) 04Marks
b) Blood groups or Sex linked inheritance(one problem) 05Marks

Q 2 Drosophila Genetics :a)Male and Female Identification 2 ½
b) Syndrome Identification 2 ½ 05Marks

Q 3. Identify and comment -Human Karyotypes (Normal and Abnormal) 2x4= 08 Marks

Q 4. Identify and comment
a) Homologus or Analogous or Vestigial organs (Any one)
b) Study of Fossil evidence: picture or model (Any one) 3x2= 06 Marks

Q 5. Identify and Comment on(Pictures)
a) Phylogeny of Man (Any two) 3x2= 06 Marks
b) Phylogeny of Horse(Any two) 3x2= 06 Marks

Q 6. Submission of Project report 05 Marks
(Specified in practical syllabus-5.9A)

Q 7. Class records 05 Marks

V SEMESTER PRACTICAL-VI 5.9 B
BASED ON CELL BIOLOGY AND IMMUNOLOGY

2 CREDITS, 15 UNITS

1 Cell biology
Preparation of squash of the given material Grasshopper for Meiosis and onion root tips for Mitosis

(Procedure to be written for squash preparation, Identification and comment on any one of the observed stage)

2 Study of Polytene chromosome or Lamp brush chromosome slide or Photograph

3 Demonstration of Mitochondria by Supra vital stain(Jenus green B)
or
3 Micro- technique a) Staining given paraffin section by double staining technique
b) Comments on use of Alcohol, Xylene, DPX and Nuclear and Cytoplasmic Stains

4 Study of Cell organelle: Centrosome, Golgi complex, Nucleus and Endoplasmic reticulum(photographs)

5 Immunology:
a) Study of Blood cells of Human beings(Types of WBC : Granulocytes and Agranulocytes)
b)Study of lymphoid organs(Thymus, Spleen, Tonsil and Lymph node)

6 Viva-Voce related to practical: Meiosis, Mitosis and Blood cells

7 Class records

V SEMESTER PRACTICAL-VI 5.9 B
BASED ON CELL BIOLOGY AND IMMUNOLOGY
SCHEME OF PARCTICAL EXAMINATION

DURATION:3 Hours **MAX.MARKS:50**

Q 1 Cell biology Squash preparations 10 Marks

Procedure to be written for squash preparation, Identification and comment on any one of the observed stage

Q 2 Study of Polytene or Lamp brush chromosome (Slide or Photograph) 06 Marks

Q3 Demonstration of Mitochondria by Supra vital stain(Jenus green B)
or
Q 3 Micro- technique
a) Staining given paraffin section by double staining technique (04Marks)

b) Comments on use of any one of the following
Alcohol, Xylene, DPX and Stains Nuclear and Cytoplasmic (02 Marks) 06Marks

Q 3 Study of Cell organelle(any two) photograph/chart 2x4=08 Marks

Q 4 Immunology: a) Study of blood cells Types of WBC -Slide/Photos **2 ½ + 2 ½** 05 Marks
(One Question from Granulocytes and One Question from Agranulocyte)

b) Lymphoid organs- Slide/Photos (Any one) 05 Marks

Q 5 Viva- Voce related to practical Meiosis, Mitosis and Blood cells 05 Marks

Q 6 Class records 05 Marks

VI SEMESTER ZOOLOGY

6.7 PAPER VII-APPLIED ZOOOGY

CREDITS -3 45 Hours

Unit: 1 Introduction to Host-parasite Relationship 02hrs

Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir and Zoonosis.

Unit:2 Epidemiology of Diseases 03hrs

Transmission, Prevention and Control of Diseases: Tuberculosis and Typhoid

Unit: 3 Rickettsia and Spirochaetes 04hrs

Brief account of Rickettsia prowazekii, Borrelina recurrentis and Treponema pallidum

Unit:4 Parasitic Helminthes 04hrs

Life history and pathogenicity of Ancylostoma duodenale, Schistoma haematobium and Wuchereria bancrofti.

Unit: 5 Sericulture 06hrs

Sericulture as a agro based industry, Species of Silkworm(Mulberry and Non Mulberry), Races of Silkworms, Brief account of Mulberry cultivation, Life cycle of Bombyxi mori, Structure and functions of Silk glands. Diseases of Silkworm: Pebrine, Muscurdine, Grassarie and Flacherie. Bi-products of silk industry.

Unit: 6 Pisciculture 05hrs

Pond culture, Processing and preservation of fishes, Economic importance of fisheries, Induced breeding(Hypophysation). Principles and Procedure of Induced breeding. Advantages of Induced breeding.

Unit: 7 Poultry 06hrs

Importance of egg in combating protein malnutrition, Poultry as subsidiary source of income. Breeds of Fowl Desi breeds, Exotic breeds. Layer, Broiler and Dual purpose. White leg horn(Mediterranean class),Plymouth rock(American class) Sussex (English class) Langshan (Asiatic class). Giriraja. A brief account of Poultry farming. Diseases of Poultry fowls: Raniket, Fowl fox, Avian leucosis and Coccidiosis.

Unit:8 Dairy 06hrs

Composition of Milk, Nutritive value of Milk, Draft breed(Hallikar), Milch breed(Red sindhi), Dual purpose breed (Ongole), Exotic breed (Holstein friesian),Cross breed(Red dane), Buffalo breed(Nagapuri and Surti).
Diseases in cattle causes and effects of Mastitis, Anthrax, Septicemia, Foot and mouth disease. Brief account of management of dairy farm.

Unit:9 Transgenic animals: 05hrs

Introduction to transgenic animals and its advantages. Nuclear transplantation method (Dolly), Micro injection method (Mice) Embryonic stem cell transplantation (Chimeric mice), Retro viral method (Mice).

Unit: 10 Assisted reproductive Technology: 04 Hrs

Cryopreservation of semen, AI, GIFT,IVF and ET Techniques.

SUGGESTED READING:

- Park.K. 2007 Preventive and Social Medicine, XVI B.B. Publishers.
- Arora.D.R. and Arora.B- 2001 Medical Parasitology. II Edition.CBS Publications.
- Kumar and Corton: Pathological Basis of Diseases.
- Dunham R.A.2004 Aquaculture and Fishery Biotechnology Genetic Approaches, CABI Publications,UK.
- Shukla and Upadayana: Economic Zoology
- Reena and Mattur: Economic Zoology
- R.C. Dubey: Biotechnology
- V.K. Kumaresan: Biotechnology
- Silk worm Biology: FAO Publications.
- N.Arumugam.Applied Zoology Saras Publication, Nagercoil.
- N.Arumugam. Aquaculture, Saras Publication, Nagercoil.
- Banerjee.G.C. 1995 Poultry. Oxford and IBH Publishers LTD,Calcutta.
- Banerjee.G.C.. 1997 A Text Book of Animal Husbandry, VII Edition, Oxford and IBH Publishing.

VI SEMESTER ZOOLOGY

6.8: PAPER VIII- ENVIRONMENTAL BIOLOGY AND ETHOLOGY

CREDITS-3 , 45 Hours

Unit 1:Fundamentals of Ecology **02 Hours**

Introduction to Ecology, Sub division of Ecology- Autoecology, Synecology and other Sub divisions.
Scope of Ecology.
Concept of Habitat, Micro habitat, Macro habitat with appropriate examples.
Concept of Ecological niche, Habitat [Spatial] niche, Tropical niche, Hyper volume [Multi dimensional niche]

Unit II: Abiotic factors **04 Hours**

Temperature: Thermal stratification, Range of tolerance, Piokilothermy and Homeothermy.
Light: Distribution, Ecological effects, Photoperiodism and bioluminescence.
Limiting factors: Liebig's Law of Minimum and Shelford's Law of Tolerance.

Unit III: Ecosystem **04 Hours**

Structure and function of Pond and Estuarine ecosystem.
Concept of Productivity, Energy flow, Laws of Thermodynamics.
Food chain, Food web, Ecological pyramids and its Significances.

Unit IV: Animal relationships **04 Hours**

Mutualism, Proto-cooperation and Commensalism.
Antibiosis, Parasitism, Predation and Competition.
Competitive exclusion principle [Gause's principle].

Unit VI: Animal Adaptations **03 Hours**

Deep sea adaptation in Fish.
Aerial adaptation in Insects.
Desert adaptation in Camel.

Unit VII:Population Ecology **02Hours**

Density, Natality, Mortality, Age distribution, Population growth, Dispersal and Biotic potential
Theory on population- Malthusian theory.

Unit VIII: Environmental pollution **04 Hours**

Pollutants, Types of pollutants, Types of pollution Air, Water and Noise [Causes, Ecological effects and Control measures].Solid waste management, Sources, Types, Effects of solid waste. Management of solid waste.

Unit IX: Toxicology **04Hours.**

Introduction, Scope and Basic divisions of Toxicology.
Toxicants, Classification of toxicants [Microbial and animal toxin].
Toxicity, Lethal concentration LC-50.
Toxic effects of heavy metals – Arsenic, Cadmium, Lead, Mercury, Chromium on Human health.

Unit X: Current Environmental issues **03 Hours**.

Ozone layer depletion, Causes, Effects and Control measures.
Green house effect and Green house gases, Causes, Effects and Control measures.
Global warming and Effects of global warming.
Acid rain, causes effects and control measures.

Unit XI: Wild life conservation and Management **03 Hours**

Wild life, Aims of wild life conservation, Necessity for conservation, Causes for wild life depletion, Threatened species, Endangered species Red data book. Major wild life Sanctuaries and National parks of India, Biosphere reserves, aims and important reserves of India
Major organization involved in wild life conservation.

Unit 12

Introduction to Ethology, Branches of Ethology **02 Hours**
Historical contributions. Aims and Objectives.

Unit13:Stereotyped behaviour/Innate behaviour **02 Hours**
Kinesis, Taxes, Reflexes, Instincts with suitable example.

Unit 14 Acquired behaviour/Learning behaviour **02Hours**

Imprinting, Habituation and Trail and error and learning with suitable example.

Unit 15 Animal Communication **03Hours**

Light, Odour, Signal and Sound with suitable example.

Unit 16: Social organization in Animals **03 Hours**

Termites and Primates.

SUGGESTED READINGS

1] Fundamentals of Ecology by Eugene. P. Odum

2] Essential Environment by Dr M.K. Goyal.

3] Toxicology by P.D. Sharma.

4] Introduction to Animal behaviour by Manning and M.S. Dawkins

6] Animal Behaviour by Reena Mathur.

7) Animal Behaviour, M.P. Arora.

8) P.S. Verma and V.K. Agarwal: Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand.

VI SEMESTER PRACTICAL-VII 6.9A
BASED ON APPLIED ZOOLOGY

2 CREDITS 15Units

1 Identify and Comment on following Bacterial strains: Salmonella typi, Mycobacterium tuberculosis, Borrelia recurrentis, Treponema pallidum, Rickettsia prowazekii- through Photographs/ Slides/Charts

2 Study of Helminthes worms: Ancylostoma duodenale, Wuchereria bancrofti and Schistoma haematobium

3 Study of Morphology of Bombyxi mori (Egg, Larva, Pupa and Moth).

4 Study of Silk glands of Bombyxi mori.(Photos/Picture/Specimens)

5 Identify and Comment on Food fishes of Karnataka

(Catla catla, Clarias, Labeo and Saccobranchus)

6 Identify and Comment on Breeds of fowl.(Photos/Picture)

(White horn, Plymouth rock, Sussex, Langshan and Giriraja)

7 Estimation of protein in Milk sample.

8 Lactometer test for water content.

9 Project on Dairy farming, Breeds of Cattle, Diseases of Cattle, Pisciculture, Poultry farming. Transgenic animals. Rearing of Silkworm. (Note: Except the photographs rest of the information to be hand written)

VI SEMESTER PRACTICAL-VII 6.9 A
BASED ON APPLIED ZOOLOGY
SCHEME OF PARCTICAL EXAMINATION

MAX.MARKS:50

Q 1:Identify and comment on any two bacterial strains(Photos/Slide)		2X3=06 Marks
Q 2:Study of Helminthes worms any one (Specimens/Photos)		03 Marks
Q3 :Study Morphology of Bombyxi mori(Any one of stage mentioned)		03 Marks
Q4: Study of Silk glands of Bombyxi mori (Specimen/ Photo)		04 Marks
Q5 Identification of food fishes of Karnataka(Specimen/ Photos)	Any two	2x4=08 Marks
Q6: Identification and Comment on breeds of Fowl (Any two)		2x4=08 Marks
Q7: Estimation of protein in Milk sample(Titration method)		
OR		
Lactometer test for water content		0 8 Marks
Q8: Project report on: Dairy farming, Breeds of Cattle, Diseases of Cattle, Pisciculture, Poultry farming , Rearing of Silkworm and Transgenic animals.		05 Marks
Q 9: Class records		05 Marks

VI SEMESTER PRACTICAL-VIII(6.9)

Practical VI Environmental Biology and Ethology 2CREDITS 15 Units

Q1) Environmental Biology Experiments:

Estimation of A] Dissolved Oxygen B] Dissolved Organic Matter

C] Salinity D] Free Carbon dioxide E] Hardness F] Alkalinity G] p^H

Note:

- Any 4 Experiments to be performed.
- A to F by Titer- metric method.
- p^H , Using p^H-meter, p^H paper.

Q2 Ecological adaptations [Taxonomy, Diagram and Comment] Any Five groups

- A] Tubiculous worms: Arenicola, Chaetopterus.
- B] Burrowing forms: Dentalium, Balanoglossus and Amphioxus.
- C] Sedentary forms: Sea anemone, Ascidia.
- D] Passive flight adaptation: Exoceteus, Draco and Rhacophorus.
- E] Parasitism: Tapeworm, Sacculina on Crab.
- F] Mimicry Camouflage: Stick insect, Chameleon.
- G] Desert form: Pharynosoma, Camel [Picture or Photograph].

Q3] Identification of Endangered Species.

Taxonomy, diagram and comment. (Any four of the following)

1] Red Panda 2] One horned Rhinoceros 3] Ridely Turtle 4] Monitor Lizard

5] Great Indian Hornbill 6) Salim Ali's Fruit bat.

Q4] Ethology: SPOTTINGS

A) Termite colony

B) Honey bee colony

C) Monkey

Q5] Submission of Project report:

1] Rain water harvesting 2] Migration in Salmon and Eel.

3] Visit to Zoo/Sanctuary/ National park (Study tour)

4] Visit to Coastal regions for collections of specimens and to study coastal diversity of fauna.

5] Eco-behavioural adaptations: Deep Sea fishes, Bioluminescence in fishes or any other animal. Flight Adaptations in Birds, Any Desert fauna, or Any Mammalian fauna. Note: Except the photographs rest of the information to be hand written.

VI SEMESTER PRACTICAL-VIII(6.9B)

Practical VI Environmental Biology and Ethology

Scheme of Practical examination

Duration 3 Hours Max Marks 50

Q 1 Environmental Biology Experiments

Any one of the Estimations from A to G 12 Marks

Q 2 Ecological adaptations: [Taxonomy, Diagram and Comment]

4 Specimens x 4 = 16 Marks

Q3 Identification of Endangered species [Taxonomy, Diagram and Comment]

Any one of the endangered species 6 Marks

Q4 Ethology (SPOTTINGS A-C, ANY ONE) 6 Marks

Q 5 Submission of Project report 5 Marks

Q 6 Class records 5 Marks