CURRICULUM FOR ZOOLOGY
IN UNDER GRADUATE DEGREE PROGRAMME

CBCS SYLLABUS SCHEDULE 2016 – 2017

By

Chairperson
Department of Zoology,
Kakatiya University
Telangana

Scheme of Instruction, Credit Structure and Examination for B.Sc. Zoology from 2016-17

Code	Semester	Course category	Title of the Paper	No. of Credits	HPW	Max. Marks			Total Marks
						I.A	End Exam	Total	
FIRST YEAR									
BS104	I	DSC-1A (Theory)	Animal Diversity-Invertebrates	4	4	20	80	100	150
		DSC-1A (Practical)		2	2	-	50	50	
BS204	II	DSC-1B (Theory)	Ecology, Zoogeography and Animal Behavior	4	4	20	80	100	150
		DSC-1B (Practical)		2	2	-	50	50	
SECOND YEAR									
BS304	III	DSC-1C (Theory)	Animal Diversity-Vertebrates and Developmental Biology	4	4	20	80	100	150
		DSC-1C (Practical)		2	2	-	50	50	
BS404	IV	DSC-1D (Theory)	Cell and Molecular Biology, Genetics and Evolution	4	4	20	80	100	150
		DSC-1D (Practical)		2	2	-	50	50	
THRID YEAR									
BS503	V	DSC-1E (Theory)	Physiology and Biochemistry	3	3	15	60	75	100
		DSC-1E (Practical)		1	1	-	25	25	
BS506		DSC-1E (Theory)	Applied Zoology or Food and Nutrition or Bioinstrumentation	3	3	15	60	75	100
		DSC-1E (Practical)		1	1	-	25	25	
BS603	VI	DSC-1F (Theory)	Immunology and Animal Biotechnology	3	3	15	60	75	100
		DSC-1F (Practical)		1	1	-	25	25	
BS606		DSC-1F (Theory)	Public Health and Hygiene or Aquatic Biology or Sericulture	3	3	15	60	75	100
		DSC-1F (Practical)		1	1	-	25	25	
			Summary of Credits	50	50	-	-	-	1000

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

I - SEMESTER

DSC-1A (Theory)

Animal Diversity – Invertebrates

Max. Marks: 80

UNIT – I

1.1 Kingdom Animalia, Brief history of Invertebrates.
1.2 Protozoa General characters and Classification up to classes with examples.
1.3 Type study of *Elphidium*, Life cycle of *Plasmodium.* Locomotion, Reproduction and Diseases of protozoans.
1.4 Porifera General characters, Classification of up to classes with examples.
1.5 Type study of *Sycon;* Canal system in sponges and Spicules.

UNIT – II

2.1 General characters and Classification of Cnidaria up to classes with examples.
2.2 Type study of *Obelia*, Polymorphism in hydrozoa; Corals and coral reef formation.
2.3 General characters and Classification of Platyhelminthes up to classes with examples.
2.4 Type study- *Schistosoma;* Parasitic Adaptations in Helminthes.
2.5 Nemathelminthes General characters, Classification of Nemathelminthes up to classes with
examples; Type study of *Dracunculus.*

UNIT – III

3.1 Annelida General characters and Classification up to classes with examples.
3.2 Type study of *Hirudinaria granulosa.*
3.3 Evolutionary significance of Coelome and Coelomoducts and metamerism.
3.4 Arthropoda General characters and Classification of Arthropoda up to classes with examples.
3.5 Type study of Prawn; Mouth parts of Insects; Insect metamorphosis; *Peripatus* - Structure
and affinities.

UNIT – IV

4.1 Mollusca General characters and Classification up to classes with examples.
4.2 Type study – *Pila*; Pearl formation; Torsion and detorsion in gastropods.
4.3 Echinodermata General characters and Classification of Echinodermata up to classes with examples.
4.4 Water vascular system in star fish; Echinoderm larvae and their significance.
4.5 Hemichordata General characters and Classification up to classes with examples; *Balanoglossus* - Structure and affinities.

Suggested Readings

1. L.H. Hyman '*The Invertebrates' Vol I, II and V*. – M.C. Graw Hill Company Ltd.

2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.

3. E.L. Jordan and P.S. Verma '*Invertebrate Zoology'* S. Chand and Company.

4. R.D. Barnes '*Invertebrate Zoology'* by: W.B. Saunders CO., 1986.

5. Barrington. E.J.W., '*Invertebrate structure and Function'* by ELBS.

6 P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.

7. Parker, T.J. and Haswell '*A text book of Zoology'* by, W.A., Mac Millan Co. London.

8. **Barnes, R.D. (1982).** *Invertebrate Zoology*, V Edition"

ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
ZOOLOGY - PAPER - I
ANIMAL DIVERSITY - INVERTEBRATES

Max. Marks: 50

1. **Study of museum slides / specimens / models (Classification of animals up to orders)**

   i. **Protozoa:** Amoeba, *Paramoecium, Paramoecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax*

   ii. **Porifera**: *Sycon, Spongilla, Euspongia, Sycon* - T.S & L.S, Spicules, Gemmule

   iii. **Coelenterata:** *Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula*

   iv. **Platyhelminthes:** *Planaria, Fasciola hepatica, Fasciola* larval forms – Miracidium, Redia, Cercaria, *Echinococcus granulosus, Taenia solium, Schistosoma haematobium*

   v. **Nemathelminthes:** *Ascaris(Male & Female), Drancunculus, Ancylostoma, Wuchereria*

   vi. **Annelida:** *Nereis, Aphrodite, Chaetopteurs, Hirudinaria,* Trochophore larva

   vii. **Arthropoda:** Cancer, Palaemon**,** Scorpion, *Scolopendra, Sacculina, Limulus, Peripatus,* Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female *Anopheles* and *Culex,* Mouthparts of Housefly and Butterfly.

   viii. **Mollusca:** *Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus,* Glochidium larva

   ix. **Echinodermata:** *Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon,* Bipinnaria larva

   x. **Hemichordata:** *Balanoglossus,* Tornaria larva

2. **Dissections:**

   Prawn: Appendages, Digestive system, Nervous system, Mounting of Statocyst
   Insect Mouth Parts

3. **Laboratory Record work shall be submitted at the time of practical examination**

4. An **"Animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

5. **Computer aided techniques should be adopted – show virtual dissections**

Suggested manuals:

1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kurl

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

II - SEMESTER

DSC-1B (Theory)

Ecology, Zoogeography and Animal Behavior

Max. Marks: 80

UNIT – I

1.1 Ecosystem structure and functions.
1.2 Types of Ecosystems –Aquatic and Terrestrial.
1.3 Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water.
1.4 Energy flow in ecosystem; Food chain, food web and ecological pyramids.
1.5 Animal Associations - Mutualism, commensalism, parasitism, competition, predation.

UNIT – II

2.1 Concept of Species, Population dynamics and Growth curves.
2.2 Community Structure and dynamics; Ecological Succession.
2.3 Ecological Adaptations.
2.4 Environmental Pollution – Sources, Effect and Control measures of Air, Water, Soil and Noise pollution.
2.5 Wildlife conservation - National parks and Sanctuaries of India, Endangered species. Biodiversity and hotspots of Biodiversity in India.

UNIT – III

3.1 Zoogeographical regions – Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities.
3.2 Wallace line
3.3 Discontinuous distribution.
3.4 Continental Drift

UNIT – IV

4.1 Types of Behaviour- Innate and Acquired, Instinctive and Motivated behavior.
4.2 Taxes, Reflexes, Tropisms.
4.3 Physiology and phylogeny of learning, trial and error learning, Imprinting, habituation, Classical conditioning, Instrumental conditioning.
4.4 Social behavior, Communication, Pheromones.
4.5 Biological rhythms, Biological clocks, Circadian rhythms.

Suggested Readings

M.P.Arora, '*Ecology*' Himalaya Publishing company.
P.D.Sharma, *Environmental Biology'*.
P.R.Trivedi and Gurdeep Raj. '*Environmental Ecology'*
Buddhadev Sarma and Tej Kumar, *Indian Wildlife Threats and Preservation*
Chapman J.L. and Reiss M.J, *Ecology Principles and Applications*, Second Ed., Cambridge University Press, London.
Benny Joseph, *Environmental Studies*, TATA MGraw Hill Com., New Delhi.
Eugene P. Odum, *Fundamentals of Ecology* Third Ed., NataraJ Publishers, Dehradun.
Veer Bala Rastogi, "Ecology and Animal Distribution"
P.K. Gupta, "Text Book of Ecology and Environment"
Bhatnagar and Bansal, "Ecology and Wildlife biology
Dasmann, "Wild life Biology"
Reena Mathur, "Animal Behaviour"
Alocock, "Animal Behaviour- an Evolutionalry Approach

B.Sc. PRACTICAL SYLLABUS FOR II SEMESTER
ZOOLOGY - Core Paper – II
Ecology, Zoogeography and Animal Behavior

Max. Marks: 50

1. Determination of pH of Soil and Water
2. Estimation of salinity (chlorides) of water in given samples.
3. Estimation of Carbonates and bicarbonates in the given water samples.
4. Estimation of dissolved oxygen of pond water, sewage water and effluents.
5. Identification of Zooplankton from a nearby water body.
6. Study of Pond Ecosystem **/** local polluted site - Report submission
7. Study of at least 3 endangered or threatened wild animals of India through photographs / specimens / models
8. Field visit to Zoo Park to study the management, behavior and enumeration of wild animals.
9. Identification of Zoogeographical realms from the Map and identify specific fauna of respective regions.
10. Observe the response of invertebrates in different lightening conditions

Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals

1**. Robert Desharnais,Jeffrey Bell,** 'Ecology Student Lab Manual, Biology Labs'
2. **Darrell S Vodopich,** 'Ecology Lab Manual'

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS
(With effect from 2016-2017)
III - SEMESTER
DSC-1C (Theory)
Animal Diversity- Vertebrates and Developmental Biology

Max. Marks: 80

UNIT – I

1.1 Salient features of Urochordata; Retrogressive metamorphosis and its significance in Urochordata.
1.2 Salient features and affinities of Cephalochordata.
1.3 General characters of Cyclostomata; Comparision of the *Petromyzon* and *Myxine.*
1.4 General characters and classification of Chordata upto orders with examples.
1.5 General characters and Classification of Fishes up to order level with examples; *Scoliodon* – Respiratory, Circulatory and Nervous system; Types of Scales and types of Fins.

UNIT – II

2.1 Amphibia General characters and Classification up to orders with examples.
2.2 Rana tigrina - Respiratory, Circulatory and Nervous system; Parental care in amphibia, Neotony.
2.3 General characters and Classification of Reptilia up to orders with examples; *Calotes* – Respiratory system, Circulatory and Nervous system.
2.4 Temporal fosse in reptiles and its evolutionary importance.
2.5 Distinguished characters of Poisonous and Non-poisonous snakes; Rhynchocephalia.

UNIT – III

3.1 Aves General characters and Classification up to orders with examples.
3.2 *Columba livia* -Digestive system, Circulatory systems, Respiratory system and Nervous system.
3.3 Migration in Birds; Flight adaptation in Birds
3.4 Mammalia General characters and Classification up to orders with examples; Rabbit –Digestive, Respiratory, Circulatory and Nervous system.
3.5 Dentition in mammals; Aquatic adaptations in Mammals.

UNIT – IV

4.1 Gametogenesis (Spermatogenesis and Oogenesis); Fertilization.
4.2 Types of eggs; Types of cleavages.
4.3 Development of Frog up to formation of primary germ layers.
4.4 Formation of Foetal membrane in chick embryo and their functions.
4.5 Types and functions of Placenta in mammals; Regeneration in Turbellaria and Lizards.

Suggested Readings:

1. E.L.Jordan and P.S. Verma '*Chordate Zoology'* -. S. Chand Publications.

2. Mohan P.Arora. '*Chordata – I*, Himalaya Publishing House Pvt.Ltd.

3. Marshal, Parker and Haswell '*Text book of Vertebrates*'. ELBS and McMillan, England.

4. Alfred Sherwood Romer. Thomas S. Pearson '*The Vertebrate Body*, Sixth edition, CBS college Publishing, Saunders College Publishing

5. George C. Kent, Robert K. Carr. *Comparative Anatomy of the Vertebrates*, 9th ed. McGraw Hill.

6. Kenneth Kardong *Vertebrates: Comparative Anatomy, Function and Evolution*, 4th ed, 'McGraw Hill.

7. J.W. Young, *The Life of Vertebrates*, 3rd ed, Oxford University press.

8. Harvey Pough F, Christine M. Janis, B. Heiser, *Vertebrate Life*, Pearson, 6th ed, Pearson Education Inc.2002.

ZOOLOGY PRACTICAL SYLLABUS
III SEMESTER - ZOOLOGY
Animal Diversity- Vertebrates and Developmental Biology

Max. Marks: 50

Study of museum slides / specimens / models (Classification of animals up to orders)

1. **Protochordata:** *Amphioxus, Amphioxus* T.S. through pharynx

2. **Cyclostomata:** *Petromyzon, Myxine, Ammocoetus larva*

3. **Pisces:** Sphyrna *Pristis, Torpedo, Channa, Pleuronectes,Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus,* Scales: Placoid, Cycloid, Ctenoid

4. **Amphibia:** *Ichthyophis, Amblystoma, Siren, Hyla, Rachophous,Bufo,Rana,* Axolotal larva

5. **Reptilia :** *Draco, Chemaeleon, Gecko, Uromastix, Vipera russeli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas.*

6. **Aves:** Archaeopteryx**,** *Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo,*Collection and study of different types of feathers: Quill, Contour, Filoplume, Down

7. **Mammalia:** *Ornithorthynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris,* Hedgehog;

Histology: T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, Bone T.S., Spinal cord.

Osteology :

1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)
2. Varanus, Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)

Dissections of *Labeo/Tilapia*:

1. Digestive system.
2. Brain, Weberian ossicles
3. V, VII, IX, X cranial nerves

Embryology

1. Study of T.S. of Testis and Ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

Laboratory Record work shall be submitted at the time of practical examination

An **"Animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Computer aided virtual dissections.

Suggested manuals

1. **S.S.Lal,** Practical Zoology – Vertebrata
2. **P.S.Verma,** A manual of Practical Zoology – Chordata
3. **Freeman & Bracegirdle,** An atlas of embryology

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS
(With effect from 2016-2017)
IV - SEMESTER
DSC-1D (Theory)
Cell and Molecular Biology, Genetics, Evolution

Max. Marks: 80

UNIT – I

1.1 Cell theory; Differences of Prokaryotic and Eukaryotic cells.
1.2 Ultrastructure of animal cell; Structure and functions of plasma membrane proteins.
1.3 Structure and functions of cell organelles – Endoplasmic reticulum, Golgi body, Ribosomes, Lysosomes, centrosomes, Mitochondria and Nucleus.
1.4 Chromosomes – Structure, types, giant chromosomes.
1.5 Cell Division - Mitosis, Meiosis; Cell cycle and its regulation.

UNIT – II

2.1 DNA (Deoxyribo Nucleic Acid) – Structure; DNA Replication.
2.2 RNA (Ribo Nucleic Acid) - Structure, types.
2.3 Protein Synthesis – Transcription and Translation.
2.4 Gene Expression – Genetic Code; operon concept.
2.5 Molecular Biology Techniques - Polymerase Chain Reaction, Electrophoresis

UNIT – III

3.1 Mendals laws of Inheritance and Non-Medelian Inheritance; Linkage and Crossing over.
3.2 Sex determination and sex-linked inheritance
3.3 Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy.
3.4.Gene mutations- Induced versus Spontaneous mutations.
3.5.Inborn errors of metabolism; One gene one enzyme, one gene one polypeptide theory.

UNIT – IV

4.1 Theories of evolution – Lamarckism and Neo-Lamarckism, Darwinism and Neo Darwinism, Modern synthetic theory.
4.2 Evidences of Evolution and Hardy Weinberg Law; Forces of Evolution – mutation, Gene flow, genetic drift, and natural selection.
4.3 Isolation – Pre-mating and post mating isolating mechanisms.
4.4 Speciation: Methods of speciation - Allopatric and sympatric.
4.5 Causes and Role of Extinction in Evolution.

Suggested readings

1. **Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnel**l *'Molecular Cell Biology'* W.H. Free man and company New York..
2. **Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008).** *Principles of Genetics*. VIII Edition.Wiley India.
3. **Snustad, D.P., Simmons, M.J. (2009).** *Principles of Genetics*. V Edition.John Wiley and Sons Inc.
4. **Klug, W.S., Cummings, M.R., Spencer, C.A. (2012).** *Concepts of Genetics*. X Edition. Benjamin Cummings.
5. **Russell, P. J. (2009).** *Genetics- A Molecular Approach*. III Edition. Benjamin Cummings.
6. **Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B.** *Introduction to Genetic Analysis*. IX Edition. W. H. Freeman and Co.
7. **Ridley, M. (2004).** *Evolution*. III Edition. Blackwell Publishing
8. **Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007).** *Evolution*. Cold Spring, Harbour Laboratory Press.
9. **Hall, B. K. and Hallgrimsson, B. (2008).** *Evolution*. IV Edition. Jones and Bartlett Publishers
10. **Campbell, N. A. and Reece J. B. (2011).** *Biology*. IX Edition, Pearson, Benjamin, Cummings.
11. **Douglas, J. Futuyma (1997).** *Evolutionary Biology*. Sinauer Associates.
12. **Minkoff, E. (1983).** *Evolutionary Biology*. Addison-Wesley.
13. **James D. Watson, Nancy H. Hopkins** '*Molecular Biology of the Gene'*
14. **Jan M. Savage**. *Evolution*, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
15. **Gupta P.K**., 'Genetics'

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER
ZOOLOGY (DSC-1D)
Cell and Molecular Biology, Genetics and Evolution

Max. Marks: 50

I. Cytology
1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Preparation and Identification of different stages of Meiosis in Grasshopper Testes
3. Identification and study of the following slides
    i). Different stages of Mitosis and Meiosis
    ii) Lamp brush and Polytene chromosomes

II. Genetics
1. Problems on Genetics - Mendelian inheritance, Linkage and crossing over, Sex linked inheritance

III. Evolution
1. Museum Study of Fossil animals: *Peripatus, Coelacanth Fish, Dipnoi fishes, Sphenodon, Archeopteryx*.
2. Study of homology and analogy from suitable specimens and pictures
3. Problems on Hardy-Weinberg Law
4. Macroevolution using Darwin finches (pictures)

Laboratory Record work shall be submitted at the time of practical examination

An **"Album**" containing photographs, cut outs, with appropriate write-up about Genetics and Evolution.

Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals

Manual of laboratory experiments in cell biology Edward, G.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

V - SEMESTER

DSC-1E (Theory)

Physiology and Biochemistry

Max. Marks: 60

UNIT – I

1.1 Digestion definition; Extra and intracellular digestion; Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
1.2 Absorption and Assimilation of digested food; Role of Gastrointestinal hormones in Digestion.
1.3 Definition of Respiration; Respiratory mechanisms – External, Internal and cellular. Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect.; Transport of CO_2 – Chloride shift; Regulation of respiration – nervous and chemical.
1.4 Types of circulation - Open and Closed circulation; Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic.
1.5 Heart function – Conduction and regulation of heart beat; Regulation of Heart rate – Tachycardia and Bradycardia; Blood Clotting mechanism.

UNIT – II

2.1 Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic.
2.2 Structure and function of Nephron; Urine formation, Counter current mechanism.
2.3 Types of Muscles; Ultra structure of skeletal muscle fibre; Sliding Filament theory, Muscle Contraction mechanism and energetics.
2.4 Structure of Neuron; Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse;
2.5 Synapse, types of synapses and Synaptic transmission.

UNIT – III

3.1 Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas.
3.2 Hormone action and concept of Secondary messengers; Male and Female Hormones; Hormonal control of Menstrual cycle in humans.
3.3 Concept and Mechanism of Homeostasis.
3.4 Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals.
3.5 Enzymes- Definition, Classification, Inhibition and Regulation.

UNIT – IV

4.1. Carbohydrates**:** Classification and function of Carbohydrates
4.2. Carbohydrate metabolism - Glycolysis, Krebs Cycle, Electron Transport and Oxidative Phosphorylation.
4.3. Proteins**:** Classification of proteins based on functions and Chemical nature.
4.4. Protein Metabolism - Transamination, Deamination and Urea Cycle
4.5. Lipids**:** Classification of Lipids; Lipid Metabolism - Fatty acid synthesis and Fatty acid oxidation.

Suggested readings

Gerard J. Tortora and Sandra Reynolds Garbowski *Principles of Anatomy and Physiology*, Tenth Ed., John Wiley & Sons
Arthur C. Guyton MD, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
William F. Ganong, *A Review of Medical Physiology*, 22 ed, McGraw Hill, 2005
Sherwood, Klandrof, Yanc, *Animal Physiology*, Thompson Brooks/Coole, 2005.
Sherwood, Klandrof, Yanc,*Human Physiology*, Thompson Brooks/Coole, 2005.
Knut Scmidt-Nielson, *Animal Physiology***,** 5th ed, Cambridge Low Price Edition.
Roger Eckert and Randal, *Animal Physiology***,** 4th ed, Freeman Co, New York**.**
Singh. H.R, Text Book of Animal Physiology and Biochemistry
Nagabhushanam , Comparative Animal Physiology
Veer Bal Rastogi, Text Book of Animal Physiology

B.Sc. III Year PRACTICAL SYLLABUS
V - SEMESTER
(DSC-1E)
Physiology and Biochemistry

Max. Marks: 25

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
3. Effect of pH and Temperature on salivary amylase activity.
4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, thyroid, pancreas, adrenal gland.
5. Estimation of Haemoglobin by Sahlis method.
6. Estimation of total protein by Lowry's method.
7. Estimation of unit Oxygen consumption of fish with reference to body weight.

- Laboratory Record work shall be submitted at the time of practical examination

- Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals

Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XII
Edition, John Wiley & Sons, Inc.
Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill
Guyton, A.C. and Hall, J.E. (2011). T*extbook of Medical Physiology,* XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). *Biochemistry*. VI Edition. W.H Freeman and Co.
Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). *Principles of Biochemistry*. IV
Edition. W.H. Freeman and Co.
Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009).
Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1E/A-Theory)

Applied Zoology

Max. Marks: 60

UNIT – I

1.1. Types of Fisheries; Culture of Fresh Water Fishes and Prawn.
1.2. Fresh water fishing gears and crafts; Induced Breeding.
1.3. Hatchery design and Management of fish and prawn; Transportation of fish and prawn seed.
1.4. Preservation, Processing and By-products of fishes.
1.5. Fish Diseases and control measures.

UNIT – II

2.1 Life cycle of *Bombyx mori.*
2.2 Structure of silk gland and secretion of silk.
2.3 Silkworm rearing technology; Spinning, harvesting and storage of cocoons.
2.4 Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and Prevention.
2.5 Prospects of Sericulture in India.

UNIT – III

3.1 Selection of Bee Species for Apiculture; Bee Keeping Equipment.
3.2 Methods of Extraction of Honey (Indigenous and Modern); Bee Diseases and Enemies.
3.3 Products of Apiculture Industry and its Uses (Honey, Bees Wax).
3.4 Introduction of Vermiculture and Vermicomposting; Vermiculture techniques; Bedding, Essential parameters for Vermiculture and Management.
3.4 Methods of Harvesting (Manual & Mechanical); Economic Importance of Vermiculture.

UNIT – IV

4.1 Classification of Fowls based on their use – Broilers and Commercial layers.
4.2 Principles of poultry breeding, Management of breeding stock and broilers, Processing and Preservation of eggs.
4.3 Poultry diseases - Viral, Bacterial, Fungal, Protozoan
4.4 Management of a modern Poultry Farm, progressive plans to promote Poultry as a Self-Employment venture.
4.5 Dairy farm and its management**;** Animal Husbandry – Introduction, Preservation of semen, Artificial insemination of cattle, Induction of early puberty and synchronization of estrus in cattle.

Suggested Readings

1. **Prost, P. J. (1962).** *Apiculture*. Oxford and IBH, New Delhi.
2. **Bisht. D.S.,** *Apiculture*, ICAR Publication.
3. **Singh S.,** *Beekeeping in India*, Indian council of Agricultural Research, NewDelhi.
4. **Ullal S.R. and Narasimhanna, M.N.** Handbook of Practical Sericulture: CSB,Bangalore
5. **Jolly. M. S.** Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore.
6. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co.
7. **Narasimhanna**, **M. N.** Manual of Silkworm Egg Production;, CSB, Bangalore 1988.
8. **Wupang—Chun and Chen Da-Chung**, Silkworm Rearing;, Pub. By FAO, Rome 1988.
9. **Sengupta**, **K.** A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore 1989.
10. **Krishnaswamy**, **S.** Improved Method of Rearing Young age silkworm;CSB,Bangalore,1986.
11. **Jhingran. V.G.** Fish and fisheries in India.,
12. **Khanna. S.S,** An introduction to fishes
13. **Santanam, B.** ***et al***, A manual of freshwater aquaculture,
14. **Boyd. C.E. & Tucker.C.S**, Pond aquaculture water quality management,
15. **Biswas.K.P,** Fish and prawn diseases,
16. **Hafez, E. S. E. (1962)**. *Reproduction in Farm Animals*. Lea & Fabiger Publisher
17. **Dunham R.A. (2004).** *Aquaculture and Fisheries Biotechnology Genetic Approache*s. CABI
18. **Pedigo, L.P. (2002)**. *Entomology and Pest Management*, Prentice Hall.
19. **Lee,** Earthworm Ecology
20. **Stevenson,** Biology of Earthworms
21. **Ranganathan L.S,** Vermicomposting technology- soil health to human health

B.Sc. III Year PRACTICAL SYLLABUS
VI - SEMESTER
(DSC-1E/A Theory)
Applied Zoology

Max. Marks: 25

1. Identification and study of important cultivable and edible fishes - Any five
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification different larvae of silk worm- Using specimens / pictures
4. Identification of mulberry and non mulberry silkworms
5. Mounting of mouth parts of adult silk worm and silk gland of larva
6. Estimation of quality of milk from different dairy farm units – specific gravity, fat content, pH viscocity.
7. Identification of purity of Honey in different samples
8. Field visits to a Vermiculture / Sericulture / fisheries / apiculture / poultry / dairy farm-submission of any 3 Reports

- **Laboratory Record work shall be submitted at the time of practical examination**

- **Computer aided techniques should be adopted as per UGC guide lines.**

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1E/B-Theory)

FOOD AND NUTRITION

Max. Marks: 60

Unit-I: Food Science & Community Nutrition

3.1 Basic concept of food & Nutrition; Classification of Food and Nutrients; Requirement and functions of Proteins, Lipids and Carbohydrates in diet.
3.2 Water - Functions, daily requirements, Water balance; Dietary Fibre sources & nutritional significance.
3.3 Elementary idea of Probiotics, Prebiotics, Organic Food.
3.4 Life style related diseases – hypertension, diabetes mellitus and obesity (causes and prevention through dietary and life style modifications).

Unit-II: Nutritional Biochemistry & Diet Therapy

2.1 Vitamins - Chemistry and biochemical role of fat soluble vitamins. A. D. E. and K. Water soluble vitamins – B1, B2, B6, niacin and C.
2.2 Minerals - Biochemical role of inorganic elements.
2.3 Therapeutic adaptations of normal diet, principles and classification of the therapeutic diets.
2.4 Dietary care and management in – Viral Hepatitis, Cirrhosis of liver, Dietary care and management in diseases of Gall Bladder and Pancreas.

Unit-III: Food Microbiology

1.1 Cultivation of microorganisms, Nutritional requirements of micro-organisms, types of media used, methods of isolation.
1.2 Introduction to important organisms in foods; Methods for destruction of microorganism in foods.
1.3 Causes, treatment & Prevention of social health problems-smoking, alcoholism, drug dependence and Acquired Immunodeficiency Syndrome (AIDS).
1.4 Food Spoilage-Contamination and microorganisms in the spoilage of different kinds of foods; Food and water borne infections and intoxications.

Unit-IV: Human Nutrition

4.1 Health and Dimension of Health- Positive health Versus absence of disease.
4.2 Irnmuunization: Importance and schedule of Immunization for children, adults and for foreign travels, role of individual, family and community in promoting health.
4.3 Concept and definition of terms - Nutrition, Malnutrition and Health, Minimum Nutritional Requirement and RDA - Formulation of RDA and Dietary Guidelines Reference Man and Reference Woman.
4.4 Energy Balance, Assessment of Energy Requirements—deficiency and excess, Determination of Energy in food, B.M.R. and its regulation

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS
(With effect from 2016-2017)
VI - SEMESTER
Elective Paper – VI

FOOD AND NUTRITION (Practical)

Marks: 25

1. Identification of Mono, Di and Polysaccharides.
2. Identification of Proteins (albumin, gelatin, peptone).
3. Determination of Acid value, Saponification value of fats and oils.
4. Estimation of Lactose in Milk.
5. Estimation of serum Protein (Biuret method and Lowry method)
6. Estimation of blood Glucose (Folin Wu method).
7. Estimation of Ascorbic acid.
8. Estimation of blood creatinine.
9. Visit to canning industry and dairy firm etc
10. Planning and preparation of low fat and low caloric diets.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1E/C-Theory)

BIOINSTRUMENTATION

Max. Marks: 60

Unit-I: Microscopy and Basic Instrumentation (Periods-15)

1.1 Microsocopy, principle & applications - Light microscope and phase contrast microscope.
1.2 Principles and applications of Fluorescence microscope, Electron microscope.
1.3 General Principle and applications of - pH meter, Colorimeter, Spectrophotometer.
1.4 Beer and Lambert.s law.

Unit II: Separation Techniques (Periods-15)

2.1 Chromatography, principle type and applicants.
2.2 Electrophoresis, Principles, types and applications PAGE and agarose gel electrophoresis.
2.3 Organelle separation by centrifugation.
2.4 Ultracentrifugation.

Unit III: Cytological Techniques (Periods-15)

3.1 Cytological techniques - Chromosome banding techniques (G.C.Q. R. banding), Flowcytometry.
3.2 Design and functioning of tissue culture laboratory – Autoclave, laminar flow, co2 incubator, inverted microscope.
3.3 Cryotechniques - Cryopreservation of cells, tissues, organs and organisms.
3.4 Histological techniques - Principles of tissue fixation – Microtomy, Staining, Mounting, Histo-chemistry

Unit IV: Molecular Biology Techniques (Periods-15)

4.1 Southern hybridization and Northern hybridization
4.2 DNA Sequencing and Polymerase chain reaction (PCR)
4.3 Autoradiography.
4.4 Immunodiffusion and Immuno electrophoresis.

Suggested Reading Materials:

1. Introduction to instrumental analysis-Robert Braun-McGraw Hill.
2. A biologist Guide to principles and Techniques of Practical Biochemistry K, Wilson and K.H. Goulding ElBS Edn.
3. Clark & Swizer. Experimental Biochemistry. Freeman, 2000.
4. Locquin and Langeron. Handbook of Microscopy. Butterwaths, 1983
5. Boyer. Modern Experimental Biochemistry. Benjamin, 1993
6. Freifelder. Physical Biochemistry. Freeman, 1982.
7. Wilson and Wlaker. Practical Biochemistry. Cambridge, 2000.
8. Cooper. The Cell-A Molecular Approach. ASM, 1997
9. John R.W. Masters. Animal Cell culture- A practical approach. IRL Press.
10. Robert Braun. Introduction to instrumental analysis. McGraw Hill

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS
(With effect from 2016-2017)
VI - SEMESTER
(DSC-1E/C)
BIOINSTRUMENTATION (Practical)

Max. Marks: 25

1. Comments upon the structure and application of analytical instruments: Microscopes, Colorimeter,
2. Demonstration of instruments: Spectrophotometer, Ultracentrifuge, Microtome
3. Demonstration of counting of cells (blood and protozoan) by haemocytometer, haemoglobinometer, pH meter.
4. Microbiological Techniques: Media Preparation and sterilization, inoculation and Monitoring.
5. Demonstration of cell culture facilities.
6. Demonstration of PCR
7. Demonstration of SDS-PAGE, Agarose Gel Electrophoresis.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

V- SEMESTER

(DSC-1F Theory)

Immunology and Animal Biotechnology

Max. Marks: 60

UNIT – I

1.1. Basic concepts of immunology; Cells of immune system; Primary and secondary Organs of immune system.
1.2. Types of Immunity – Innate and acquired.
1.3. Basic properties of antigens; Structure, function and types of an antibody.
1.4. B and T cell epitopes, haptens, adjuvants; Antigen-antibody reactions.
1.5. T-Cell and B-Cell activation; Monoclonal antibodies and their production.

UNIT – II

2.1 Structure and functions of major histocompatibility complex.
2.2 Basic properties and functions of Cytokines, Interferons and complement proteins.
2.3 Humoral and Cell mediated immunity.
2.4 Types of hyper sensitivity.
2.5 Concepts of autoimmunity and immunodeficiency; Introduction to Vaccines and types of Vaccines

UNIT – III

3.1 Concept and Scope of Animal Biotechnology.
3.2 Cloning vectors - Plasmids, Cosmids, Lambda bacteriophage, YAC,
3.3 Cloning- Cloning methods (Cell, Animal and Gene cloning)
3.4 Animal Cell culture - Equipment and materials for animal cell culture,
3.5 Applications of cell culture techniques

UNIT – IV

4.1 Recombinant DNA technology and its applications.
4.2 Transgenesis – Methods of Transgenesis.
4.3 Production of Transgenic animals.
4.4 Application of Transgenic animals in Biotechnology.
4.5 Stem cells –types and their applications.

Suggested Readings

Arthur C. Guyton MD, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
William F. Ganong, *A Review of Medical Physiology*, 22 ed, McGraw Hill, 2005
Sherwood, Klandrof, Yanc, *Human Physiology*, Thompson Brooks/Coole, 2005.
Knut Scmidt-Nielson, *Animal Physiology***,** 5th ed, Cambridge Low Price Edition.
Richard A. Glodsby, Thomas J Kind, Barbara A. Osborne, Janis Kuby, *Immunology,* 5th ed, Freeman and Co. New York
Ivan Roitt, *Immunology***,** 4th ed, Johanthan Brostoff, Moshy, London.
Thomas C. Chung, *General Parasitology***,** Hardcourt Brace and Co ltd. Asia. New Delhi.
Gerard D. Schmidt and Larry S Roberts, *Foundations of Parasitology***,** McGraw Hill
Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. Immunology. W.H. Freeman and Company.
Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition. Roitt's Essential Immunology, Blackwell Publishing.

B.Sc. III Year PRACTICAL SYLLABUS
V- SEMESTER
(DSC-1F)
Immunology and Animal Biotechnology

Max. Marks: 25

I. Immunology

1. Identification of Blood groups
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Enumeration of RBC & WBC from a given blood sample
4. Enumeration of Differential count of WBC from a given blood sample
5. Demonstration of
   a. ELISA b. Immunoelectrophoresis
6. Identification of Autoimmune disease through charts.

II. Animal Biotechnology

1. Study the following techniques through photographs / virtual lab
   a. Southern blotting
   b. Western blotting
   c. DNA sequencing (Sanger's method)
   d. DNA finger printing
   e. Identification of Vectors
   f. Identification of Transgenic animals
2. PCR demonstration /virtual lab

- **Laboratory Record work shall be submitted at the time of practical examination**

- **Computer aided techniques should be adopted as per UGC guide lines.**

Suggested manuals

Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H. Freeman and Company.
David, M., Jonathan, B., David, R. B. and Ivan R. (2006). Immunology, VII Edition,
Mosby, Elsevier Publication.
Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1F/A)

Public Health and Hygiene

Max. Marks: 60

UNIT – I

1.1 Classification of foods - Carbohydrates, proteins, lipids, vitamins and minerals.
1.2 Balanced diet and Malnutrition.
1.3 Nutritional deficiencies and disorders- Carbohydrates, proteins, lipids, vitamins and minerals.

UNIT-II

2.1 Environment and health Impact assessment: concept, steps and applications.
2.2 Occupational, Industrial, agricultural and urban Health-Exposure at work place, urban areas, industrial workers, farmers and agricultural labourers, Health workers and health disorders and diseases.
2.3 Environmental pollution and associated Health hazards; Water borne diseases; Air borne diseases

UNIT-III

3.1 Causes, Symptoms, Diagnosis, Treatment and Prevention - Malaria, Filaria, Measles, Polio, Chicken pox, Rabies, Plague, Leprosy.
3.2 Causes, Symptoms, Diagnosis, Treatment and Prevention Tuberculosis and AIDS.
3.2 Causes, Symptoms, Diagnosis, Treatment and Prevention of Non communicable diseases – Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

UNIT-IV

4.1 Health care legislation in India – termination of pregnancy act, Maternity benefit act.
4.2 Transplantation of human organs act, Child Labour act, Biomedical waste act, ESI act.
4.3 WHO Programmes – Government and Voluntary Organizations and their health services First Aid and Health awareness, personal health care record maintenance.

Suggested Readings

1. Park and Park, 1995: Text Book of Preventive and Social Medicine – Banarsidas Bhanot Publ. Jodhpur – India.
2. Public Health at the Crossroads Achievements and Prospects. Robert Beaglehole and Ruth
3. Bonita 2nd Edition Cambridge University Press 3. Maxcy Rosenau Last Public Health &
4. Preventive Medicine, Fourteenth Edition Ed Robert Wallace, MD, et al. 4.
5. Epidemiology and Management for Health Care: Sathe, P.V. Sathe, A.P., PopularPrakashan,
6. Mumbai, 1991. 5.
7. International Public Health: Diseases, Programs, Systems, and Policies by
8. Michael Merson, Robert E Black, Anne J Mills Jones and Bartlett Publishers. 6.

B.Sc. III Year PRACTICAL SYLLABUS
VI - SEMESTER
(DSC-1F/A)
Public Health and Hygiene

Max. Marks: 25

1. Medical fitness– Determine the following:
   BMI, Blood Pressure, Cholesterol (LDL, HDL) Heamoglobin
   Complete Blood Picture; Complete urine examination
2. Qualitative identification of carbohydrates, Lipids, vitamins, lipids and minerals,
3. Estimation of fat content and tests milk adulteration**.**
4. Qualitative and quantitative survey methods in public health sciences.
5. Identification of parasitic stages of malaria and filaria through permanent slides
6. Estimation of blood glucose level in a normal and diabetic persons.
7. Project report on Epidemiological survey, different diseases such as Malaria; Chicken gunya; AIDS, Diarrhoea
8. Epidemiological survey of a slum area to identify the diseases due to poor sanitation and contaminated drinking water.
9. Visit to a community water purification and treatment plant.
10. Visit to an industry to study occupational health hazard and safety of industrial workers (sugar/milk dairy/textile/cement).
11. Visit to agricultural fields to study occupational health of farmers and agricultural laborers.

- **Laboratory Record work shall be submitted at the time of practical examination**

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B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1F/B, Theory)

AQUATIC BIOLOGY

Max. Marks: 60

UNIT – I

1.1. Brief introduction of the aquatic biomes.
1.2. Freshwater ecosystem (lakes, wetlands, streams and rivers), Estuaries, intertidal zones.
1.3. Oceanic pelagic zone, marine benthic zone.
1.4. Coral reefs.

UNIT – II

2.1. Lakes: Origin and classification of lakes, Lake as an Ecosystem, Lake morphometry.
2.2 Physico-chemical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity: dissolved gases (Oxygen, Carbon dioxide).
2.3 Nutrient Cycles and Lakes- Nitrogen, Sulphur and Phosphorous.
2.4 Streams: Different stages of stream development, Physico-chemical environment, adaptation of hill-stream fishes.

UNIT – III

3.1 Salinity and density of sea water,
3.2 Continental shelf,
3.3 Adaptation of deep sea organisms.
3.4 Sea weeds**.**

UNIT – IV

4.1 Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil Spills.
4.2 Eutrophication.
4.3 Management and conservation.
4.4 Water pollution acts of India; Sewage treatment and water quality assessment - BOD and COD.

B.Sc. III Year PRACTICAL SYLLABUS

(With effect from 2016-2017)

VI - SEMESTER

(DSC-1F/B)

AQUATIC BIOLOGY

Marks: 25

PRACTICAL

1. Study of the topography of a lake
2. Physico-Chemical and biological analysis of a lake
   Physico-Chemical analysis of water - O2, CO2, BOD, COD
   Biological– Zooplanktons – Identification and population density of Zooplanktons of a lake
3. Determination of - Turbidity / transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body.
4. Instruments used in limnology (secchi disc, van dorn bottle, conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant / Marine bio-reserve/Fisheries Institutes.

Suggested Readings

1. Ananthakrishnan : Bioresources Ecology 3rd Edition
2. Goldman – Limnology, 2nd Edition
3. Odum and Barrett – Fundamentals of Ecology, 5th Edition\
4. Pawlowski: Physicochemical Methods for water and Wastewater Treatment, 1st Edition
5. Wetzel: Limnology, 3rd edition
6. Trivedi and Goyal: Chemical and biological methods for water pollution studies

Welch: Limnology Vols.I-II

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS

(With effect from 2016-2017)

VI – SEMESTER

(DSC-1F/C)

SERICULTURE

Max. Marks: 60

Unit-1: Silk industry and mulberry production

1.1 Historical account and types of silkworms
1.2 Sericulture as rural industry and employment generation
1.3 Morphology and anatomy of mulberry.
1.4 Mulberry plantation and package of practices.
1.5 Pest and diseases of mulberry.

Unit-2: Silkworm biology and silkworm seed production

2.1 External characters of silkworms
2.2 Anatomy of silkworm.
2.3 Establishment of modal grainage house and grainage equipments
2.4 Seed production process.
2.5 Egg preservation and hibernation schedules.

Unit-3: Silkworm cocoon production and crop production

3.1 Rearing requirements- rearing house, equipments and disinfection.
3.2 Rearing of silkworms - incubation, hatching, brushing and rearing methods (Chawkie and late age silkworm).
3.3 Mounting, spinning and harvesting of cocoons
3.4 Pests of silkworm
3.5 Diseases of silkworm.

Unit-4: Post cocoon production

4.1 Physical and commercial characteristics of cocoon.
4.2 Natural and synthetic fibres- types, identification and uses.
4.3 Cocoon handling- stifling, cooking and brushing.
4.4 Silk reeling process.
4.5 Raw silk testing and grading.

B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS
(With effect from 2016-2017)
VI – SEMESTER
(DSC-1F/C, Practical)
SERICULTURE-Practical

Max. Marks: 25

1. Morphology of mulberry plant with reference to various vegetative and floral parts.
2. Collection and identification of pests and disease of mulberry and control measures
3. Anatomy of stem, root, leaf, petiole (Section cuttings & preparation of permanent slide).
4. Anatomy of silkworm- Digestive system, silk gland, respiratory system.
5. Mother moth examination (Individual and mass mother moth examination).
6. Identification of Mulberry and non mulberry silkworm
7. Identification of rearing equipments, chawkie and late age worms.
8. Identification different diseases and pest of silkworms and control measures.
9. Determination of silk ratio percentage of cocoons.
10. Identification test for natural and synthetic fibres.

Reference Books

1. Ganga, G. and Sulochana Chetty, J. (1995) **An introduction to Sericulture** *(3rd Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi*.
2. Sandhya Rani S (1998) **Sericulture and Rural Development**. *Discovery Publishing House, New Delhi*.
3. Rangaswamy, G., Narasimhanna, M. N., Kasiviswanathan, K., Sastry, C. R. and Jolly, M.S. (1976) **Sericulture Manual 1- Mulberry Cultivation**. *Food and Agricultural services Bulletin 15/1. Food and Agriculture Organization of the United Nations, Rome.*
4. Krishnaswamy, S., Narasimhanna, M. N., Suryanarayan, S. K. and Kamaraj, S. (1973) **Sericulture Manual 2- Silkworm Rearing**. *Food and Agricultural services Bulletin 15/2. Food and Agriculture Organization of the United Nations, Rome.*
5. Madan Mohan Rao (1999) **Comprehensive Sericulture Manual**. *B. S. Publications, Hyderabad*.
6. Ganga, G. (2003) **Comprehensive Sericulture, Volume 2: Silkworm Rearing and Silk Reeling**. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*
7. Govindan, R., Narayanaswamy, T. K. and Devaiah, M. C. (1998) **Principles of Silkworm Pathology**. *Seri Scientific Publishers, Bangalore*.
8. Tribhuvan Singh and Pramod Kumar Singh (2013) **Mulberry Crop Protection**. *Discovery Publishing House Pvt. Ltd., New Delhi*.
9. Manjeet S. Jolly (Ed.) (1987) **Appropriate Sericulture Techniques**. *International Centre for Training & Research in Tropical Sericulture, Mysore.*
10. Krishnaswami, S., Madhava Rao, N. R., Suryanarayan, S. K. and Sundaramurthy, T. S. (1972) **Manual-3, Silk Reeling**. *FAO Agricultural Services Bulletin 15/3. Food and Agriculture Organization of the United Stations, Rome.*
11. Thammanna N. Sonwalkar (2001) **Handbook of Silk Technology**. *New Age International (P) Limited, Publishers, New Delhi*.

B.Sc. Zoology

CBCS Pattern in Semester System

(with effect from 2016-17)

Scheme of Theory, Practical Question Papers

and

Scheme of Internal Assessment Examination

SCHEME OF QUESTION PAPER

B.Sc (Zoology) I/II/III/IV Semester
I-Internal Assessment Examination*
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] [Marks: 20

Answer ALL questions. Each question carries equal marks (2 x 10 = 20)

1. From Unit 1
2. From Unit 1
3. From Unit 1
4. From Unit 1
5. From Unit 2
6. From Unit 2
7. From Unit 2
8. From Unit 2
9. From Unit 1 or 2
10. Seminar

SCHEME OF QUESTION PAPER

B.S (Zoology) I/II/III/IV
II – Internal Assessment Examination*
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] [Marks: 20

Answer ALL questions. Each question carries equal marks (2 x 10 = 20)

1. From Unit 3
2. From Unit 3
3. From Unit 3
4. From Unit 3
5. From Unit 4
6. From Unit 4
7. From Unit 4
8. From Unit 4
9. From Unit 3 or 4
10. Attendance (Above 80%)

**The internal marks will be calculated on the average of two internal tests*

SCHEME OF QUESTION PAPER

B.Sc (Zoology) V/VI Semester
I-Internal Assessment Examination*
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] [Marks: 15

Answer ALL questions. Each question carries equal marks (1.5 x 10 = 15)

1. From Unit 1
2. From Unit 1
3. From Unit 1
4. From Unit 1
5. From Unit 2
6. From Unit 2
7. From Unit 2
8. From Unit 2
9. From Unit 1 or 2
10. Seminar

SCHEME OF QUESTION PAPER

B.S (Zoology) V/VI Semester
II – Internal Assessment Examination*
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] [Marks: 15

Answer ALL questions. Each question carries equal marks (1.5 x 10 = 15)

1. From Unit 3
2. From Unit 3
3. From Unit 3
4. From Unit 3
5. From Unit 4
6. From Unit 4
7. From Unit 4
8. From Unit 4
9. From Unit 3 or 4
10. Attendance (Above 80%)

**The internal marks will be calculated on the average of two internal tests*

B.Sc (Zoology)
CBCS Pattern in Semester System (*with effect from 2016-17*)

SCHEME OF QUESTION PAPER

B.Sc (Zoology) I/II/III/IV Semester-Theory
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] [Marks: 80

SECTION-A: SHORT ANSWER QUESTIONS (12 x 4 = 48)

Answer any 12 questions

1. From Unit-I
2. From Unit-I
3. From Unit-I
4. From Unit-I
5. From Unit-II
6. From Unit-II
7. From Unit-II
8. From Unit-II
9. From Unit-III
10. From Unit-III
11. From Unit-III
12. From Unit-III
13. From Unit-IV
14. From Unit-IV
15. From Unit-IV
16. From Unit-IV

SECTION-B: ESSAY TYPE ANSWER QUESTIONS (4 X 8 = 32)

Answer all questions

1. (a) From Unit-I

OR

(b) From Unit-I

2. (a) From Unit-II

OR

(b) From Unit-II

3. (a) From Unit-III

OR

(b) From Unit-III

4. (a) From Unit-IV

OR

(b) From Unit-IV

B.Sc (Zoology)
CBCS Pattern in Semester System (*with effect from 2016-17*)

SCHEME OF QUESTION PAPER

B.Sc (Zoology) V/VI Semester-Theory
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] [Marks: 60

SECTION-A: SHORT ANSWER QUESTIONS (8 x 4 = 32)

Answer any 8 questions

1. From Unit-I
2. From Unit-I
3. From Unit-I
4. From Unit-II
5. From Unit-II
6. From Unit-II
7. From Unit-III
8. From Unit-III
9. From Unit-III
10. From Unit-IV
11. From Unit-IV
12. From Unit-IV

SECTION-B: ESSAY TYPE ANSWER QUESTIONS (4 X 7 = 28)

Answer all questions

1. (a) From Unit-I

OR

(b) From Unit-I

2. (a) From Unit-II

OR

(b) From Unit-II

3. (a) From Unit-III

OR

(b) From Unit-III

4. (a) From Unit-IV

OR

(b) From Unit-IV

SCHEME OF PRACTICAL QUESTION PAPER

B.Sc (Zoology) I/II/III/IV Semester
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] [Marks: 50

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1. Major experiment	-	15 Marks
2. Minor experiment	-	10 Marks
3. Spottings	-	15 Marks
A.		
B.		
C.		
D.		
E.		
4. Record	-	05 Marks
5. Viva-voce	-	05 Marks

SCHEME OF PRACTICAL QUESTION PAPER

B.Sc (Zoology) V/VI Semester
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] [Marks: 25

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1. Experiment-1	-	10 Marks
2. Experiment-2	-	10 Marks
3. Record and Viva-voce	-	05 Marks

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