SYLLABUS FOR B.Sc. ZOOLOGY COURSE (2017-18)
Choice Based Credit System (CBCS)

S.No	Paper	Module(Paper)	Hours	IA	End Exam	Credits
	Semester I					
1	Paper I (Core)	Animal Diversity-Invertebrates	04	20	80	04
2	Practicals-I	Animal Diversity-Invertebrates	02		25	02
	Semester II					
3	Paper II (Core)	Ecology, Zoogeography, Animal behavior	04	20	80	04
4	Practicals-II	Ecology, Zoogeography, Animal behavior	02		25	02
	Semester III					
5	Paper III (Core)	Animal Diversity- Vertebrates and Developmental Biology	04	20	80	04
6	Practicals-III	Animal Diversity- Vertebrates and Developmental Biology	02		25	02
	Semester IV					
7	Paper IV (Core)	Cell Biology, Genetics and Evolution	04	20	80	04
8	Practicals-IV	Cell Biology, Genetics and Evolution	02		25	02
	Semester V (Batch 2015)					
10	Paper V (Core)	Animal physiology - I	04	25	75	03
11	Practicals-V	Animal physiology - I	03		50	01
12	Advanced Elective-I	Aqua culture & fisheries	03	25	75	02
13	Practicals Advanced Elective -I	Aqua culture & fisheries	03		50	01
14	Advanced Elective-II	Sericulture	03	25	75	02
15	Practicals Advanced Elective -II	Sericulture	03		50	01
	Semester VI(Batch 2015)					
16	Paper VI (Core)	Animal physiology – II Genetics & evolution	04	25	75	03
17	Practicals-VI	Animal physiology – II Genetics & evolution	03		50	01
18	Applied Elective-I	Clinical science & Animal Biotechnology	03	25	75	02
19	Practicals Applied Elective-I	Clinical science & Animal Biotechnology	03		50	01
20	Applied Elective-II	Medical diagnostics	03	25	75	02
21	Practicals Applied Elective-II	Medical diagnostics	03		50	01
22	Project Work	On the given topic				01
	One Elective only is Compulsory in Respective Semester V and VI.					

GOVERNMENT CITY COLLEGE, HYDERABAD

(Autonomous)

Affiliated to Osmania University

Re-Accredited with 'A' Grade by NAAC

High Court Road, Hyderabad – 500 002

DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING

Zoology Syllabus and Panel of Examiners

(2017-18)

03-04-2017

Board of Studies (2017-18):

Composition as per UGC –XII Plan guidelines Annexure – V:

S.No	Name		Signature
01.	Suprabha Panda	Chairperson BOS, Government city college	
02.	Prof. K. Pratap Reddy	Chairperson BOS, Osmania University.	
03.	Prof. V. Vanita Das	BOS member Nominated by Academic Council	
04.	Dr. J. Venkateshwar rao	BOS member Nominated by Academic Council	
05.	S. Venkanna	Member	
06.	B. Srilatha	Member	

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –I
Module –I /Core-I
Animal Diversity - Invertebrates

Periods: 60 **Max. Marks: 80**
04 hrs/week & 3 Credits

UNIT – I **(15 Periods)**

1.1 Brief history of Invertebrates
1.1.1 Kingdom Animalia
1.1.2 Brief history of Invertebrates

1.2 Protozoa
1.2.1 General characters
1.2.2 Classification up to classes with examples
1.2.3 Type study - *Elphidium*
1.2.4 Life cycle of *Plasmodium.*
1.2.5 Locomotion, Reproduction and Diseases

1.3 Porifera
1.3.1 General characters
1.3.2 Classification of Porifera up to classes with examples
1.3.3 Type study - *Sycon*
1.3.4 Canal system in sponges and Spicules.

UNIT – II **(15 Periods)**

2.1. Cnidaria
2.1.1 General characters
2.1.2 Classification of Cnidaria up to classes with examples
2.1.3 Type study - *Obelia*
2.1.4 Polymorphism in hydrozoa
2.1.5 Corals and coral reef formation

2.2 Platyhelminthes
2.1.1 General characters
2.1.2 Classification of Platyhelminthes up to classes with examples
2.1.3 Type study- *Schistosoma*

2.3 Nemathelminthes
2.3.1 General characters
2.3.2 Classification of Nemathelminthes up to classes with examples
2.3.3 Type study - *Dracunculus*
2.3.4 Parasitic Adaptations in Helminthes

UNIT – III **(15 Periods)**

3.1 Annelida

3.1.1 General characters
3.1.2 Classification of Annelida up to classes with examples
3.1.3 Type study - *Hirudinaria granulosa.*
3.1.4 Evolutionary significance of Coelome and Coelomoducts and metamerism

3.2 Arthropoda

3.2.1 General characters
3.2.2 Classification of Arthropoda up to classes with examples
3.2.3 Type study - Prawn
3.2.4 Mouth parts of Insects
3.2.5 Insect metamorphosis
3.2.6 *Peripatus* - Structure and affinities

UNIT – IV **(15 Periods)**

4.1 Mollusca

4.1.1 General characters
4.1.2 Classification of Mollusca up to classes with examples
4.1.3 Type study - *Pila*
4.1.4 Pearl formation
4.1.5 Torsion and detorsion in gastropods

4.2 Echinodermata

4.2.1 General characters
4.2.2 Classification of Echinodermata up to classes with examples
4.2.3 Water vascular system in star fish
4.2.4 Echinoderm larvae and their significance

4.3 Hemichordata

4.3.1 General characters
4.3.2 Classification of Hemichordata up to classes with examples
4.3.3 *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"

PRACTICALS SEMESTER –I
Module –I /Core-I
Animal Diversity - Invertebrates

02 hrs/week & 1 Credits

Periods: 30 **Max. Marks: 25**

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

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

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

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

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

xii. **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.

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

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

xviii. **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. I Year
ZOOLOGY PRACTICAL MODEL FOR I SEMESTER
ZOOLOGY - PAPER - I
ANIMAL DIVERSITY - INVERTEBRATES

Time: 2 Hrs.

Max.Marks: 25

1. Identification, labeled diagram and salient features of spots: (7 Museum specimens + 2 slides)	10
2. Dissection (one) (Diagram -02 + Dissection & Display-05)	05
3. Field Visit & Note Book	02
4. Project Work	02
5. Certified practical record	02
6. Animal Album	02
7. Viva voce	02

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –II
Module –II /Core-II
Ecology, Zoogeography and Animal Behavior

Periods: 60 **Max. Marks: 80**
04 hrs/week & 3 Credits

UNIT – I **(15Periods)**

1.1 Ecology - I

1.1.1 Ecosystem structure and functions.
1.1.2 Types of Ecosystems –Aquatic and Terrestrial.
1.1.3 Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water.
1.1.4 Energy flow in ecosystem.
1.1.5 Food chain, food web and ecological pyramids.
1.1.6 Animal Associations - Mutualism, commensalism, parasitism, competition, predation.

UNIT – II **(15 Periods)**

2.1 Ecology – II

2.1.1 Concept of Species, Population dynamics and Growth curves.
2.1.2 Community Structure and dynamics and Ecological Succession.
2.1.3 Ecological Adaptations.
2.1.4 Environmental Pollution – Sources, Effect and Control measures of Air, Water, Soil and Noise pollution,
2.1.5 Wildlife conservation - National parks and Sanctuaries of India, Endangered species.
2.1.6. Biodiversity and hotspots of Biodiversity in India.

UNIT – III **(15 Periods)**

3.1 Zoogeography

3.1.1 Zoogeographical regions – Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities
3.1.2 Wallace line, Discontinuous distribution
3.1.3. Continental Drift

UNIT – IV **(15 Periods)**

4.1 Animal Behaviour

4.1.1 Types of Behaviour- Innate and Acquired, Instinctive and Motivated behaviour
4.1.2 Taxes, Reflexes, Tropisms
4.1.3 Physiology and phylogeny of learning, trial and error learning, Imprinting, habituation, Classical conditioning, Instrumental conditioning
4.1.5 Social behavior, Communication, Pheromones
4.1.6 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 Evolutionary Approach

PRACTICALS-Module- II
Ecology, Zoogeography and Animal Behavior

02 hrs/week & 1 Credits

Periods: 30 **Max. Marks: 25**

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'

PRACTICAL MODEL PAPER FOR II SEMESTER
ZOOLOGY - Core Paper – II
Ecology, Zoogeography and Animal Behavior

Time: 2 Hrs. **Max. Marks: 25**

1. Identification, labeled diagram and salient features of Spots: (04 spots)	08
2. Estimation of dissolved oxygen of a pond,	07
3. Identify any **two** Zooplankton in a given water samples	02
4. Field Visit & Note Book	02
5. Project Report	02
6. Certified practical record	02
7. Viva voce	02

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –III Module –III /Core-III
Animal Diversity- Vertebrates and Developmental Biology

Periods: 60 **Max. Marks: 80**

UNIT – I **(15 Periods)**

1.1. Urochordata, Cephalochordata, Cyclostomata

1.1.1. Salient features of Urochordata
1.1.2. Retrogressive metamorphosis and its significance in Urochordata
1.1.3. Salient features and affinities of Cephalochordata
1.1.4. General characters of Cyclostomata
1.1.5. Comparison of the *Petromyzon* and *Myxine*
1.1.6. General characters and classification of Chordata upto orders with examples.

1.2. Pisces

1.2.1. General characters of Fishes
1.2.2. Classification of fishes up to order level with examples
1.2.3. *Scoliodon* – Respiratory, Circulatory and Nervous system. (Structural aspect only)
1.2.4. Types of Scales and types of Fins

UNIT – II **(15 Periods)**

2.1. Amphibia

2.1.1. General characters of Amphibians
2.1.2. Classification of Amphibians up to orders with examples.
2.1.3. *Rana tigrina* - Respiratory, Circulatory and Nervous system. (Structural aspect only)
2.1.4. Parental care in amphibian; neoteny and paedogenesis.

2.2 Reptilia

2.2.1. General characters of Reptilia
2.2.2. Classification of Reptilia up to orders with examples
2.2.3. *Calotes* – Respiratory system, Circulatory and Nervous system. (Structural aspects only)
2.2.4. Distinguished characters of Poisonous and Non poisonous snakes.
2.2.5. Rhynchocephalia.
2.2.6. Temporal fosse in reptiles and its evolutionary importance

UNIT – III **(15 Periods)**

3.1. Aves

3.1.1. General characters of Aves
3.1.2. Classification of Aves up to orders with examples.
3.1.3. *Columba livia* -, Digestive system, Circulatory systems, Respiratory system and Nervous system. (Structural aspects only)
3.1.4. Migration in Birds
3.1.5. Flight adaptation in Birds

3.2. Mammalia

3.2.1. General characters of Mammalia
3.2.2. Classification of Mammalia up to orders with examples
3.2.3. Rabbit –Digestive, Respiratory, Circulatory and Nervous system. (structural aspects only)
3.2.4. Dentition in mammals.
3.2.5. Aquatic adaptations in Mammals.

UNIT – IV **(15 Periods)**

4.1 Developmental Biology and Embryology

4.1.1 Gametogenesis (Spermatogenesis and Oogenesis)
4.1.2 Fertilization
4.1.3 Types of eggs
4.1.4 Types of cleavages
4.1.5 Development of Frog up to formation of primary germ layers
4.1.6 Formation of Foetal membrane in chick embryo and their functions
4.1.7 Types and functions of Placenta in mammals
4.1.8 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.

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - CORE PAPER - III

Animal Diversity- Vertebrates and Developmental Biology

Periods: 30 **Max. Marks: 25**

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 russelli, 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:** *Ornithorhynchus, 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. II Year

ZOOLOGY PRACTICAL MODEL FOR III SEMESTER

ZOOLOGY - CORE PAPER - III

Animal Diversity- Vertebrates and Developmental Biology

Time: 2 Hrs. **Max. Marks:25**

1. Identification, labeled diagram and salient features of spots: (4 Museum specimens + 2 slides)	12
2. Osteology (01 Spots)	02
3. Dissection (one) (Diagram -02 + Dissection & Display-03)	05
4. Embryology (01 Spots)	02
5. Certified practical record	02
7. Viva voce	02

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –IV
Module –IV /Core-IV
Cell Biology, Genetics & Evolution

Periods: 60 **Max. Marks: 80**

UNIT – I **(15 Periods)**

1. Cell Biology

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

UNIT – II **(15 Periods)**

2. Molecular Biology

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

UNIT – III **(15 Periods)**

3. Genetics

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

UNIT – IV **(15 Periods)**

4. Evolution

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.
4.3. Forces of Evolution – mutation, gene flow, genetic drift, and natural selection.
4.4. Isolation – Pre-mating and post mating isolating mechanisms
4.5. Speciation: Methods of speciation - Allopatric and sympatric

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'

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY Core Paper – IV

Cell Biology, Genetics and Evolution

Periods: 30 **Max. Marks: 25**

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. II Year

B.Sc. PRACTICAL MODEL PAPER FOR IV SEMESTER

ZOOLOGY - CORE PAPER - IV

Cell Biology, Genetics and Evolution

Time:2 Hrs. **Max.Marks: 25**

1. Identification, labeled diagram and salient features of spots: (04 spots)	08
2. Prepare and Identify Mitotic divisions with onion root tips:	05
3. One Problem from Genetics	03
4. One Problem from Evolution	03
5. Certified practical record	02
6. Album	02
7. Viva voce	02

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18 (for 2015 Batch)
SEMESTER –V/ Core-V
ANIMAL PHYSIOLOGY-I

Periods: 60 **04 hrs/week & 3 Credits**

Unit-I **20hrs**

Physiology of Digestion.

1.1 Definition of digestion and types of digestion - extra and intracellular.
1.2 Digestion of Carbohydrates, proteins, lipids and cellulose digestion.
1.3 Absorption and assimilation of digested food materials.
1.4 Gastrointestinal hormones - control of digestion.

Physiology of respiration.

1.5 Types of respiration - external and internal respiration.
1.6 Gaseous exchange.
1.7 Transport of oxygen - formation of oxy hemoglobin and affinity of hemoglobin for Oxygen, Oxygen dissociation curves.
1.8 Transport of $C0_2$ - Chloride shift, Bohr Effect.

Unit-II **20hrs**

Physiology of Circulation.

2.1 Open and closed circulation.
2.2 Working mechanism of Mammalian heart - Heart beat and cardiac cycle. Myogenic and neurogenic hearts.
2.3 Regulation of heart rate - Tachycardia and Bradycardia.

Physiology of Excretion.

2.4 Definition of excretion.
2.5 Forms of nitrogenous waste material and their formation: classification of animals on the basis of excretory products.
2.6 Structure and function of Nephron - Counter current mechanism.

Unit-III

Physiology of Endocrine system. **20hrs**

4.1 Hormones of hypothalamus.
4.2 Hormones of pituitary gland. (Adenohypophysis and Neurohypophsis).
4.3 Hormones of pineal gland, thyroid gland, parathyroid, thymus, adrenal and pancreas.
4.4 Endocrine control of mammalian reproduction - Male and female hormones - Hormonal control of menstrual cycle in humans.

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY Core Paper – V

ANIMAL PHYSIOLOGY-I

03 hrs/week & 1 Credits

1. Identification of carbohydrates, proteins and lipids.
2. Unit Oxygen Consumption in an aquatic animal (fish or crab)
3. Quantitative analysis of excretory products.
4. Demonstration of salivary amylase

REFERENCE BOOKS

1. 'Essentials Animal Physiology' by S. C. Rastogi.'

2. Animal Physiology' by H. C. Nigam.

3. 'Biology' **by** Campbell & Reece.

4. Animal Physiology' — Agarwal, R.A. Srivastava, Kaushal, Anil and Kumar.

5. 'Animal Physiology' **and** Biochemistry' by Dr. B. Annadurai.

6.'Principles of Animal Physiology' by Christopher D. Moyes, Patricia M Schulte.

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –V
ADVANCED ELECTIVE- 1
AQUACULTURE AND FISHERIES

3 Hrs/week & 2 Credits

60hrs

UNIT I **20hrs**

1.1 Introduction to aquaculture.
1.2 Types of fisheries - capture and culture fisheries.
1.3 Finfish fisheries and shell fish fisheries, Site selection criteria.
1.4 Reproductive system of fish life cycle- Spawn, fry, fingerlings and stock fish.
1.5 Fishery resources from fresh water, brackish water and marine habitates.
1.6 Fresh water, brackish water and mariculture (special reference to prawn and oysters).
1.7 Fishing crafts and fishing gears.

UNIT II **20hrs**

Aquaculture Systems

2.1. Indore rearing systems-Indoor recirculation and Outdoor recirculation systems. Fish farming methods.
2.2. Induced breeding -importance of induced breeding process of hypophysation with ex. common carp fishes.
2.3. Hatchery design and management.
2.4. Construction and Management of fish pond.
2.5. Bund breeding and types of bunds.
2.6. Management of nursery, rearing and stocking ponds with special reference to pre stocking, stocking, and post stocking measures.

UNIT III **20hrs**

3.1. Larval rearing in different ponds of the Hatchery.
3.2. Seed transport, Seed production-incubation and Hatching different kinds of incubators.
3.3. Fish products-primary and secondary products.
3.4.. Common diseases and control.
3.5 Post harvest technology -preservation of fishes, prawn by drying, salting, pickling, and scientific methods like freezing, canning.

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY Core Paper – V
AQUACULTURE AND FISHERIES

03 hrs/week & 1 Credits

FISHERIES AND AQUACULTURE

1.0 Identification of important Freshwater and Marine edible fishes (Minimum 10)

2.0 Identification of important edible prawns (Minimum 5)

FIELD WORK:

Field work is compulsory. Field trip to local fisheries / aquaculture unit is to be conducted and mortified field note book should be submitted at the time of practical examination.

REFERENCE BOOKS

1. the Fishes of India' – Francis Day. Vol – I & II. William dawson & Sons Ltd, 1958.
2. General and Applied Ichthyology' (Fish and Fisheries) S. K. Gupta and P. C. Gupta., S. Chand Publishers
3. 'Fish and fisheries of India' – V. G. Jhingran, Hindustan publishing company., 1985
4. Aquaculture productivity – V. R. P. Sinha and H. C. Siaslara Oxford IBH, 1991.
5. Advances in aquaculture – T. V. R. Pillay and M. A. Dill., Fishing news Books Ltd., 1979.

SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –V
ADVANCED ELECTIVE- II
SERICULTURE

3 Hrs/week & 2 Credits

Unit 1:

1.1 Introduction Sericulture as an agro industry
1.2 Mulberry cultivation – Varieties of mulberry,
1.3 Diseases of Mulberry & their management - bacteria, Fungal & Viral diseases
1.4 Insect pest of Mulberry & their management
1.5 Rearing of Silkworms

Unit 2:

1.1 Biology, food plants & culture of mulberry & non mulberry silkworms i.e tasar, eri, & munga.
1.2 External morphology of Silkworm : egg, larva, pupa & adult
1.3 Internal morphology of Silkworm; Digestive, Respiratory, Nervous, Excretory & reproductive systems
1.4 Morphology & anatomy of Silk glands
1.5 Properties & composition of Silk.

Unit 3:

3.1 Silkworm rearing house & Rearing appliances
3.2 Environmental conditions fro silk worm rearing
3.3 Rearing of early stages (chawki rearing) & last stages of Silkworm
3.4 Mounting & harvesting of Silkworm cocoons
3.5 Silkworm disease & pest

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY Core Paper – V
Sericulture

1. Study of life history of Silk worm by rearing
2. Identification of different types of Silk worm- mulberry, tasar, eri & munga.
3. Identification of diffective cocoons
4. Rearing appliances
5. Sex differentiation of larva, pupa & adult silk worm

REFERENCE BOOKS

1. Handbook of Practical Sericulture: S.R. Ullal and M.N. Narasimhanna CSB, Bangalore
2. Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI, Mysore.
3. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. Ltd., Tokyo, Japan1972.
4. Manual of Silkworm Egg Production; M. N. Narasimhanna, CSB, Bangalore 1988.
5. Silkworm Rearing; Wupang—Chun and Chen Da-Chung, Pub. By FAO, Rome 1988
6. A Guide for Bivoltine Sericulture; K. Sengupta, Director, CSR & TI, Mysore 1989.
7. Improved Method of Rearing Young age silkworm; S. Krishnaswamy, reprinted CSB, Bangalo

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –VI Core -VI,
ANIMAL PHYSIOLOGY-II, GENETICS AND EVOLUTION

04 hrs/week & 3 Credits

60hrs

Unit -1 **20hrs**

Physiology of muscle contraction.

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

Physiology of nerve impulse

1.5 Structure of nerve cell.
1.6 Nature of nerve impulse - resting potential and action potential.
1.7 Conduction of nerve impulse along an axon.
1.8 Structure of synapse, mechanism of synaptic transmission

UNIT – II Genetics **20hrs**

2.1 Menders laws - Law of segregation and independent assortment; Genetic interactions - Incomplete dominance, co dominance and epitasis.
2.2 Central dogma of molecular .biology- Brief account of DNA replication (Semi conservative method), Replication fork (Continuous and discontinuous synthesis);
2.3 Transcription - Brief account initiation, elongation and termination in eukaryotes; Translation; Genetic code; gene regulation as exemplified by lac operon.
2.4 Human karyotyping, Amniocentesis chromosomal disorders

UNIT III Organic Evolution **20hrs**

3.1 Genetic basis of Evolution, Gene pool and gene frequencies.
3.2 Hardy-Weinberg's Law, Force of destabilization.
3.3 Natural selection, genetic drift.
3.4 Mutations.
3.5 Isolation and Migration.
3.6 Speciation-Allopatry and sympatry.

PRACTICAL PAPER - CORE –VI
ANIMAL PHYSIOLOGY-II, GENETICS AND EVOLUTION

03 hrs/week & 1 Credits

GENETICS

1. A. B. O blood group identification
2. Problems based on Blood grouping.
3. Karyotyping of human chromosomes (Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the ideogram)
4. Identification of genetic syndromes given on charts.
5. Problems based on Mendelian inheritance (at least one problem for each for the laws of segregation and law of independent assortment).

REFERENCE BOOKS

1. Biology: The Science of Life' by R. A. Wallace, G. P. Sanders & R. J. Ferl.
2. Biology: Concepts **and** Applications' by Starr
3. Genetics by C. B. Powar., Himalaya Publishing House Pvt. Ltd
4. Genetics by P. K. Gupta
5. Cell Biology, Genetics, Evolution and Ecology by P.S Varma & V. K. Agrawal..S. Chand & Company

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –VI APPLIED ELECTIVE-I
CLINICAL SCIENCE AND ANIMAL BIOTECHNOLOGY

60hrs

04 hrs/week & 3 Credits

UNIT-I **20hrs**

Hematology

1.1 Blood composition and functions.
1.2 Blood groups and transfusion problems.
1.3 Blood diseases —Anemia, Leukemia, Leucocytosis, and Leucopaenia.
1.4 Biopsy and autopsy - Clinical importance.

UNIT II **20hrs**

Immunology and Human Parasites

2.1. Types of immunity — Innate and acquired.
2.2. Antigens - Haptenes and epitopes and their properties.
2.3. Structure and biological properties of human immunoglobulin G (IgG).
2.4. Hypersensitivity - immediate and delayed
2.5 Blood parasites -Only structure and Clinical significance of Plasmodium. (No life history).
2.6. Intestinal parasites -Only Structure and clinical significance of Entamoeba, Giardia,' Taenia solium, Ancylostoma, Enterobius. (No life history).

UNIT-III **20hrs**

Animal Biotechnology:

3.1 Animal Biotechnology: Scope of Biotechnology, Cloning vectors - Characteristics of vectors, Plasmids.
3.2. Gene Cloning - Enzymatic cleavage of DNA, Restriction enzymes (Endonucleases) and Ligation
3.3. Transgenesis and Production of transgenic animals (Fish and Goat).
3.4. Application of Stem Cell technology in cell based therapy (Diabetes and Parkinson's diseases)

PRACTICAL PAPER - SEMESTER –VI- APPLIED ELECTIVE-I

CLINICAL SCIENCE AND ANIMAL BIOTECHNOLOGY

03 hrs/week & 1 Credit

CLINICAL SCIENCE:

1.0 Identification of the following protozoan parasites.

a) Entameoba histolytica
b) Giardia intestinalis
C) Balantidium coli
d) Trypanosoma gambiense
e) Plasmodium — Any two stages

2.0 Identification of the following helminthes parasites

a) Taenia solium
b) Ascari(Male&Female)
c) Enterobius Vermicularis
d) Dracunculus medinenesis
e) Encyclostoma duodenale

3.0 Blood cell count- RBC and WBC

4.0 Estimation of Hemoglobin (Sahi's Method)

ANIMAL BIOTECHNOLOGY:

1.0 Identification of vectors (charts or photographs)

2.0 Identification of genetic disorders (charts or photographs)

3.0 Identification of transgenic animals (charts or photographs)

GOVERNMENT CITY COLLEGE (AUTONOMOUS), HYDERABAD
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2017-18
SEMESTER –VI APPLIED ELECTIVE-II
MEDICAL DIAGNOSTICS

3 Hrs/week & 2 Credits

Unit 1 Introduction to medical diagnostics and its importance

1.1 History of medial microbiology.

1.2 Definition of infection, non-specific defense mechanisms, mechanical barriers,

1.3 Antagonism of indigenous flora.

1.4 General principles of diagnostic microbiology.

1.5 Collection, transport and processing of clinical samples.

Unit 11

2.1 General methods of laboratory diagnosis – cultural, biochemical

2.2 Serological and molecular methods.

2.3 Tests for antimicrobial susceptibility.

2.4 Dilution methods, disk diffusion method *Broth dilution tests.*

UNIT – III Microorganisms and Diseases

3.1General account of the following diseases – causal organisms, pathogenesis,

epidemiology, diagnosis, prevention

3.2 Control of: Air-borne diseases - Tuberculosis, Influenza

3.3 Insect-borne diseases - Malaria, Filariasis, Dengue fever

3.4 Contact diseases - Syphilis, Gonorrhoea

3.5 Zoonotic diseases - Rabies, Anthrax

3.6 Blood-borne diseases - Serum hepatitis, AIDS

SEMESTER –VI APPLIED ELECTIVE-II
PRACTICALS: MEDICAL DIAGNOSTICS

1. Blood tests – TC, DC and ESR.

2. Estimation of blood hemoglobin.

3. Determination of blood groups and Rh typing.

4. Acid-fast staining of mycobacterium (stained/permanent slides).

5. Antibiotic sensitivity testing – disc diffusion method.

6. Parasites – Malaria parasite, *Entamoeba* (study of permanent slides).

7. Observation of fungal pathogen *(Candida*).

8. Tests for disinfectant (Phenol coefficient

REFERENCE BOOKS

• Park, K. (2007), *Preventive and Social Medicine*, B.B. Publishers
• Godkar P.B. and Godkar D.P. *Textbook of Medical Laboratory Technology*, II Edition, Bhalani Publishing House
• Cheesbrough M., *A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses*
• Guyton A.C. and Hall J.E. T*extbook of Medical Physiology*, Saunders
• Robbins and Cortan, *Pathologic Basis of Disease*, VIIIEdition, Saunders
• Prakash, G. (2012), *Lab Manual on Blood Analysis and Medical Diagnostics*, S. Chand and Co. Ltd.

PANEL OF EXAMINERS:

1. Dr.M.Sujatha- Govt Degree College for Girls, Begumpet,Hyderabad.

2. Dr G.Parameshwar Rao - Govt Degree College,Khairathabad,Hyderabad

3 .Dr.P.Moha Rao - N.B.Science College, Charkaman, Hyderabad.

4. Dr.N.Thulasi- Govt Degree College,Khairathabad,Hyderabad

5. Smt.J.Asha - BJR Degree College, Bazarghat, Nampally, Hyderabad.

6. Dr.D.Rajeshwari - AMS College, O.U Campus, Hyderabad.

7. Dr.G.N.Bhagyarekha - AMS College, O.U Campus, Hyderabad.

8. Dr.J.Venkateshwar Rao- Nizam College O.U Campus,Hyderabad .

9. Dr. S.Padmaja- Nizam College O.U Campus .Hyderabad.

10. Dr B. Neeraja- Koti Womens college, Hyderabad

GOVERNMENT CITY COLLEGE (AUTONOMOUS)
Question paper model for Semester V & VI (CBCS Pattern)
Subject: Zoology

Time: 3 Hours Max.Marks:75

I. Very Short Answer Questions 5X2 = 10M
(Answer all Questions)
1.
2.
3.
4.
5.
(At least one question from each unit)

II. Short answer Question 7X5 = 35M
(Answer any seven Questions)
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
(Three Questions should be given from each unit

III. Essay Questions 10X3 = 30M
(Answer all questions)
1. A OR B
2. A OR B
3. A OR B

Receipt

Received an amount of Rs. 1500/- (Fifteen thousand only) from the office of the Principal, Govt.City College, Hyderabad towards honorarium for attending the Board of studies meeting in the Dept. of Zoology, Govt. City college, Hyderabad for the academic year 2017-18.

Date: Signature

Name & Designation

Receipt

Received an amount of Rs. 1000/- (one thousand only) from the office of the Principal, Govt.City College, Hyderabad towards honorarium for attending the Board of studies meeting in the Dept. ofZoology, Govt. City college, Hyderabad for the academic year 2017-18.

Date: Signature

Name & Designation

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Date:

Signature

Name & Designation

GOVERNMENT CITY COLLEGE (AUTONOMOUS)
Question paper model for Semester I, II, III &IV (CBCS Pattern)
Subject: Zoology

Time : 3 hrs **max marks: 80**

Section- A

I) Short Answers: **5x4=20M**

Answer any five questions

1.

2.

3.

4.

5.

6.

7.

8.

Note: Two questions are compulsory from each unit.

Section- B

II) Long Answer Questions: **4x15=60M**

9. (A) or (B)

10. (A) or (B)

11. (A) or (B)

12. (A) or (B)

Note: Two questions are compulsory from each unit with internal choice.

GOVERNMENT CITY COLLEGE (AUTONOMOUS)

Practical Question paper model for Semester I (CBCS Pattern)

Subject: Zoology

Time: 2hrs **Max Marks: 25**

1. Identify the given spotters(1-7 specimens & 2-slides) giving reasons for the identification with a neat labeled diagram. **[5x2=10M]**
2. Dissect and display and draw a neat labeled diagram **[4+1=5M]**
3. Field visit and note book. Write a report on the observations made and submit during practical examination. **[2 marks]**
4. Project work **[2 marks]**
5. Certified practical Record **[2 marks]**
6. Animal album. **[2 marks]**
7. Viva voice **[2 marks]**