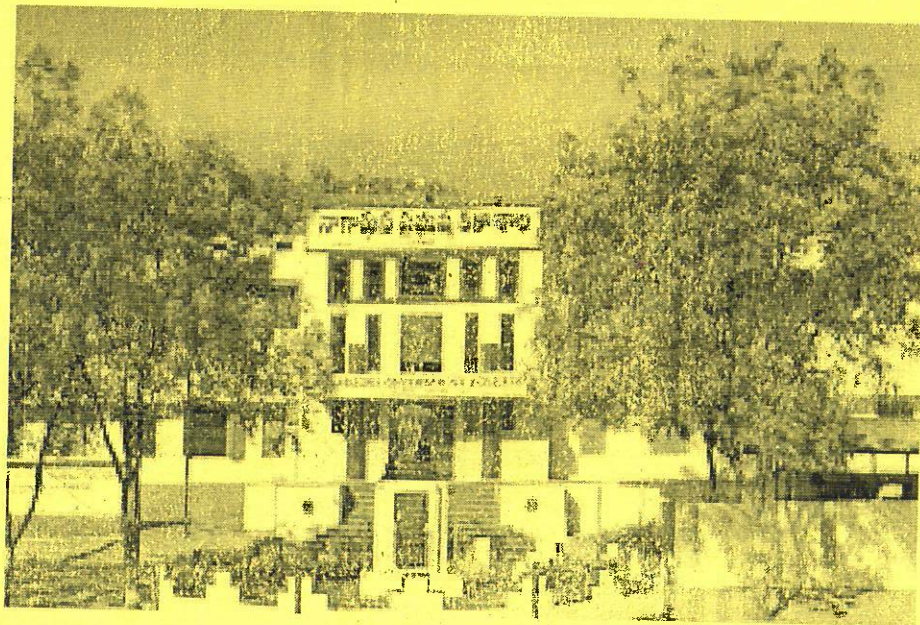


NAGARJUNA GOVERNMENT COLLEGE , NALGONDA
(AUTONOMUS) Reaccredited by NAAC with “A” Grade
(Affiliated to Mahatma Gandhi University)
(www.ngcnalgonda.org)

BOARD OF STUDIES 2019-20

DEPARTMENT OF ZOOLOGY




BOARD OF STUDIES MEETING

The members of Board of studies in zoology Department ,N.G. College ,Nalgonda met under the Chairmanship of Sri.V.NANDA KUMAR on 25/10/2019 and passed the following resolutions.


AGENDA

1. To consider and approve the syllabus for B.Sc. I,II,III Years (I,II,III,IV,V&VI semesters) for the academic year 2019-20.
2. To consider and approve the New syllabus for I year (I &II SEM) students for the Academic year 2019-20.
3. To consider and approve the General Elective for the V & VI semester students , the elective is **APPLIED ZOOLOGY(paper VI) & AQUATIC BIOLOGY A(PAPER VIII) .**
4. To consider and approve the continuation of Internal Assessment for the Students admitted in to I,II,&III year degree course during 2019-20.
5. To consider and approve the CBCS and cumulative grade point average(CGPA)system for the I year and II &III year Students as per the Mahatma Gandhi University new syllabus
6. To consider and approve to conduct semester wise practical Examinations for the I,II,&III year 2019-20.
7. To consider and approve the list of examiners for paper setting and evaluation for B.Sc. I,II,III years (I,II,III,IV,V&VI SEMESTERS) FOR THE ACADEMIC YEAR 2019-20.
8. To consider and approve the model Question papers for BSC I,II AND III years for the academic year 2019-20.
9. Any other related academic matter.




DEPARTMENT OF ZOOLOGY
Govt. Degree College for Women,
NALGONDA.


Sub. Exp-1


DEPARTMENT OF ZOOLOGY,
K.N.M. Govt. Degree College
MIRYALGUDA.

Head Dept. of Zoology
NAGARJUNA GOVT. COLLEGE
NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(AUTONOMOUS)

NO: / BOS/zoology/acad/2019-20

DATE : 25/10/2019

TO

University Nominee, MGU,
Asst. Professor J. Swamy,
Department of zoology,
G.D.C WOMENS ,Nalgonda.

SUB:- Nagarjuna Govt.college, Nalgonda(Autonomous)-convening the meeting of
Board of studies Zoology on 25/10/2019 Intimation-Request-Reg.

Sir,

I am happy to inform that you have been nominated as University Nominee as a
Member of Board of Studies in the Department of Zoology of this college for the
year 2019-20.

The meeting of the Board of studies Zoology will be held on 25/10/2019 in the
Department of Zoology to consider the following Agenda.

- 1.To approve the syllabus and model question papers for I, II, III, IV, V & VI
semesters.
- 2.To approve the Introduction of internal assessment.
- 3.To approve the list of examinations for paper setting and evaluation.
- 4.Any other matter with permission of the chair.

You are requested to make it convenient to attend the meeting and extend your
cooperation.

In-Charge /

Chairman BOS

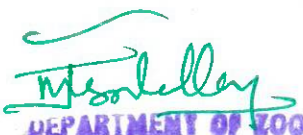

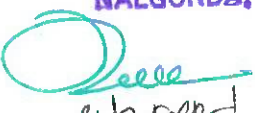

Principal

ZOOLOGY DEPARTMENT
Head Dept. of Zoology
NAGARJUNA GOVT. COLLEGE
NALGONDA.

DEPARTMENT OF ZOOLOGY
Tert. Degree College for Women
NALGONDA.

DEPARTMENT OF ZOOLOGY
K.N.M. Govt. Degree College
MIRYALGUDA.

DEPARTMENT OF ZOOLOGY
BOARD OF STUDIES : 2019-20

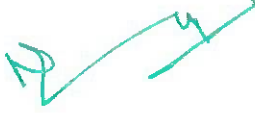
CATEGORY		NAME & DESIGNATION	SIGNATURE
1	University Nominee	Asst. Professor J.SWAMY GDC (W)Nalgonda, Chairman BOS, MGU,Nalgonda	 DEPARTMENT OF ZOOLOGY Jert. Degree College for Women NALGONDA.
2	Chairman Board of studies	V.NANDA KUMAR In charge Department of zoology	 Head Dept. of Zoology NAGARJUNA GOVT. COLLEGE NALGONDA.
3	Subject expert from outside the college	R.NARESH Asst.Professor Department of zoology, GDC (W) NALGONDA J.NARENDER REDDY Asst.Professor Department of zoology, KNM Degree College MLG	 Sub. Exp-1  DEPARTMENT OF ZOOLOGY, K.N.M. Govt. Degree College MIRYALGUDA.
4	Members: All The Faculty members of the Dept.	S.SRINARTH PATEL Asst.Professor Department of zoology,	
		V. SARITHA Contract lecturer Department of zoology	
		.Venkateshwarlu Guest lecturer Department of zoology	


Submitted by chairman BOS

Proposals approved principal

APPROVED THE PANEL OF EXAMINERS FOR PAPER SETTING
AND EVALUATION FOR THE YEAR 2019-20

SL NO	PAPER	NAME OF THE LECTURER	DESIGNATION	CELL NO
1	I	1.J. NARENDER REDDY	Asst. Professor K.N.M Degree college MLG	8374939833
		2. SRINIVAS SHAREN	Asst. Professor K.R.R Degree college KODAD	994996795
		3. K. NEERAJA	Asst. Professor GDC JADCHERLA	9502053812
2	II	1.R.NARESH	Asst. Professor K.N.M Degree college MLG	8919920204
		2. Dr. RAJITHA	Asst. Professor GDC ALAIR	8692586942
		3. Dr. CHITTARANJAN RAO	Asst. Professor GDC NARSAPUR	9440785877
3	III	1. J. SWAMY	Asst. Professor GDC (W) NALGONDA	9848385850
		2. Dr. RAJITHA	Asst. Professor GDC ALAIR	8692586942
		3. SRINIVAS SHAREN	Asst. Professor K.R.R Degree college KODAD	994996795
4	IV	1. R.NARESH	Asst. Professor GDC (W) NALGONDA	8919920204
		2. Dr. CHITTARANJAN RAO	Asst. Professor GDC NARSAPUR	9440785877
		3. K. NEERAJA	Asst. Professor GDC JADCHERLA	9502053812


Head Dept. of Zoology
NAGARJUNA GOVT. COLLEGE
NALGONDA


DEPARTMENT OF ZOOLOGY
Govt. Degree College for Women
NALGONDA


Sub. Exp- 1


DEPARTMENT OF ZOOLOGY
K. N. M. Govt. Degree College
MIRYALGUDA

SL NO	PAPER	NAME OF THE LECTURER	DESIGNATION	CELL NO
5	V	1.J. SWAMY	Asst. Professor GDC (W) NALGONDA	9848385850
		2. J.NARENDER REDDY	Asst. Professor K.N.M Degree college MLG	8919920204
		3. R .NARESH	Asst. Professor GDC (W)NALGONDA	9502053812
6	VI	1.R.NARESH	Asst. Professor K.N.M Degree college MLG	8919920204
		2. Dr. RAJITHA	Asst. Professor GDC ALAIR	8692586942
		3. Dr. CHITTARANJAN RAO	Asst. Professor GDC NARSAPUR	9440785877
7	VII	1. R.NARESH	Asst. Professor GDC (W) NALGONDA	9848385850
		2. Dr. RAJITHA	Asst. Professor GDC ALAIR	8692586942
		3.J.NARENDER REDDY	Asst. Professor K.N.M Degree college MLG	994996795
8	VIII	1. J.SWAMY	Asst. Professor GDC (W) NALGONDA	8919920204
		2. Dr. CHITTARANJAN RAO	Asst. Professor GDC NARSAPUR	9440785877
		3. K. NEERAJA	Asst. Professor GDC JADCHERLA	9502053812

Head Dept. of Zoology
NAGARJUNA GOVT. COLLEGE
NALGONDA

DEPARTMENT OF ZOOLOGY
Govt. Degree College for Women
NALGONDA,

DEPARTMENT OF ZOOLOGY
K.N.M. Govt. Degree College
MIRYALGUDA.

QUESTION PAPER DESIGN

SECTION –A


To give five very short questions and ask them to answer all questions (at least One question from each unit)

SECTION- B

To give Six Short questions and ask them to answer any four questions (at least one question from each unit)


SECTION- C

To give 4 long Questions with internal choice and ask them to answer all questions(one question from each unit)


Head Dept. of Zoology
NABARJUNA GOVT. COLLEGE
NALGONDA.


DEPARTMENT OF ZOOLOGY
Govt. Degree College for Women
NALGONDA.


Sub EPP-1


DEPARTMENT OF ZOOLOGY
K.N.M. Govt. Degree College
NIRYALGUDA

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS 2019

B.Sc. I Year
I - SEMESTER
Discipline Specific Course, Paper – I
Animal Diversity – Invertebrates

Periods: 60

Max. Marks: 70

UNIT – I :

1.1 Protozoa.

(15 Periods)

- 1.1.1 General characters and classification of Protozoa upto order levels with examples
- 1.1.2 Type study – *Elphidium*
- 1.1.3 Locomotion and Reproduction in Protozoa.
- 1.1.4 Epidemiology of Protozoan diseases - Amoebiasis; Giardiasis; Leishmaniasis and Malaria.

1.2 Porifera

- 1.2.1. General characters and classification of Porifera upto order levels with examples
- 1.2.2 Type study – *Sycon*
- 1.2.3 Canal system in sponges and Spicules.

UNIT – II

(15 Periods)

2.1. Cnidaria

- 2.1.1 General characters and classification of Cnidaria upto order levels with examples
- 2.1.2 Type study - *Obelia*
- 2.1.3 Polymorphism in Siphonophora
- 2.1.4 Corals and coral reef formation

2.2 Platyhelminthes

- 2.2.1 General characters
- 2.2.2 Classification of Platyhelminthes up to classes with examples
- 2.2.3 Type study- *Schistosoma*

2.3 Nematelminthes

- 2.3.1 General characters
- 2.3.2 Classification of Nematelminthes 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

Practical One Credit equal to 3hrs

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS 2019

- 3.2.3 Type study - Prawn
- 3.2.4 Crustacean larvae
- 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

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*"

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS 2019

B.Sc. I Year
ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
Discipline Specific Course, Paper – I
ANIMAL DIVERSITY - INVERTEBRATES

Periods: 45

Max. Marks: 50

1. Study of museum slides / specimens / models (Classification of animals up to orders)
 - i. Protozoa: Amoeba, Paramecium, Paramecium 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. Nematelminthes: Ascaris (Male & Female), Dracunculus, 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
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 2019

B.Sc. 1 Year

ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
Discipline Specific Course, Paper – I
ANIMAL DIVERSITY - INVERTEBRATES

Time: 3 Hrs.

Marks: 50

1. Identification, labeled diagram and salient features of spots: (8Museum specimens + 3 slides)	22
2. Dissection (one) (Diagram -02 + Dissection & Display-08)	10
3. Project Work	05
4. Certified practical record	05
5. Animal Album	03
6. Viva voce	05

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS 2019

**B.Sc. I Year
II - SEMESTER
Core Paper – II**

Animal Diversity- Vertebrates

Periods: 60

Max. Marks: 100

UNIT – I

(15 Periods)

1.1 Hemichordata

- 1.1.1 General characters
- 1.1.2 Classification of Hemichordata up to classes with examples
- 1.1.3 *Balanoglossus* - Structure and affinities

1.2. Urochordata, Cephalochordata, Cyclostomata

- 1.2.1. Salient features of Urochordata
- 1.2.2. Retrogressive metamorphosis and its significance in Urochordata
- 1.2.3. Salient features and affinities of Cephalochordata
- 1.2.4. General characters of Cyclostomata
- 1.2.5. Comparison of the *Petromyzon* and *Myxine*
- 1.2.6. General characters and classification of Chordata upto orders with examples.

UNIT – II

(15 Periods)

2.1. Pisces

- 2.1.1. General characters of Fishes
- 2.1.2. Classification of fishes up to order level with examples
- 2.1.3. *Scoliodon* – Respiratory, Circulatory and Nervous system.
- 2.1.4. Types of Scales and types of Fins

2.2. Amphibia

- 2.2.1. General characters of Amphibians
- 2.2.2. Classification of Amphibians up to orders with examples.
- 2.2.3. *Rana tigrina* - Respiratory, Circulatory and Nervous system.
- 2.2.4. Parental care in amphibian; neoteny and paedogenesis.

UNIT – III

(15 Periods)

3.1 Reptilia

- 3.1.1. General characters of Reptilia
- 3.1.2. Classification of Reptilia up to orders with examples
- 3.1.3. *Calotes* – Respiratory system, Circulatory and Nervous system.
- 3.1.4. Temporal fosse in reptiles and its evolutionary importance
- 3.1.5. Distinguished characters of Poisonous and Non poisonous snakes.

3.2. 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.
- 3.1.4. Migration in Birds
- 3.1.5. Flight adaptation in Birds

UNIT – IV

(15 Periods)

Practical One Credit equal to 3hrs

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS 2019

4.1. Mammalia

- 4.1.1. General characters of Mammalia
- 4.1.2. Classification of Mammalia up to orders with examples
- 4.1.3. Rabbit –Digestive, Respiratory, Circulatory and Nervous system.
- 4.1.4. Dentition in mammals.
- 4.1.5. Aquatic adaptations in Mammals.

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. ZOOLOGY SYLLABUS UNDER CBCS 2019

B.Sc. I Year
ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER
ZOOLOGY - CORE PAPER - II
Animal Diversity- Vertebrates

Periods: 45

Max. Marks: 50

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

1. **Hemichordata:** *Balanoglossus*, Tornaria larva
2. **Protochordata:** *Amphioxus*, *Amphioxus* T.S. through pharynx
3. **Cyclostomata:** *Petromyzon*, *Myxine*, *Ammocoetus* larva
4. **Pisces:** *Sphyrna Pristis*, *Torpedo*, *Channa*, *Pleuronectes*, *Hippocampus*, *Exocoetus*, *Echieneis*, *Labeo*, *Catla*, *Clarius*, *Auguilla*, *Protopterus*, Scales: Placoid, Cycloid, Ctenoid
5. **Amphibia:** *Ichthyophis*, *Amblystoma*, *Siren*, *Hyla*, *Rachophous*, *Bufo*, *Rana*, Axolotal larva
6. **Reptilia :** *Draco*, *Chamaeleon*, *Gecko*, *Uromastix*, *Vipera russelli*, *Naja*, *Bungarus*, *Enhydrina*, *Typhlops*, *Testudo*, *Trionyx*, *Crocodylus*, *Ptyas*.
7. **Aves:** *Archaeopteryx*, *Passer*, *Psittacula*, *Bubo*, *Alcedo*, *Columba*, *Corvus*, *Pavo*; Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
8. **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

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 2019

B.Sc. I Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - CORE PAPER - II

Animal Diversity- Vertebrates and Developmental Biology

Time: 2 Hrs.

Max. Marks: 50

1. Identification, labeled diagram and salient features of spots: (7 Museum specimens + 3 slides)	20
2. Osteology (02 Spots)	04
3. Dissection (one) (Diagram + Dissection & Display)	10
4. Embryology (02 Spots)	04
5. Certified practical record	05
6. Animal Album	02
7. Viva voce	05

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year

III - SEMESTER

Discipline Specific Course, Paper – III

[Code: BS305; Course Type DSC 2C]

Animal Diversity- Vertebrates and Developmental Biology

Periods: 60

Max. Marks: 50

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.
- 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.
- 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.
- 2.2.4. Temporal fosse in reptiles and its evolutionary importance
- 2.2.5. Distinguished characters of Poisonous and Non poisonous snakes.
- 2.2.6. Rhynchocephalia.

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

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

Nervous system.

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.

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. ZOOLOGY SYLLABUS UNDER CBCS 2019

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - CORE PAPER - III

Animal Diversity- Vertebrates and Developmental Biology

Time: 2 Hrs.

Max. Marks: 50

1. Identification, labeled diagram and salient features of spots: (7 Museum specimens + 3slides)	20
2. Osteology (02 Spots)	04
3. Dissection (one) (Diagram + Dissection & Display)	10
4. Embryology (02 Spots)	04
5. Certified practical record	05
6. Animal Album	02
7. Viva voce	05

practical One Credit equal to 3hrs

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

**B.Sc. II Year
IV - SEMESTER**

**Discipline Specific Course, Paper – IV
[Code: BS405; Course Type DSC 2D]
Cell Biology, Genetics & Evolution**

Periods: 60

Max. Marks: 50

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
- 4.6. Causes and Role of Extinction in Evolution.

Suggested readings

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell '*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. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

Discipline Specific Course, Paper – IV

[Code: BS405; Course Type DSC 2D]

Cell Biology, Genetics and Evolution

Periods: 30

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. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year

B.Sc. PRACTICAL MODEL PAPER FOR IV SEMESTER

Discipline Specific Course, Paper – IV

Cell Biology, Genetics and Evolution

Time: 3 Hrs.

Max. Marks: 50

- | | |
|---|----|
| 1. Identification, labeled diagram and salient features of spots:
(07 spots) | 14 |
| 2. Prepare and Identify Mitotic divisions with onion root tips: | 12 |
| 3. One Problem from Genetics | 05 |
| 4. One Problem from Evolution | 05 |
| 5. Certified practical record | 05 |
| 6. Album | 04 |
| 7. Viva voce | 05 |

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year

V - SEMESTER

Discipline Specific Course, Paper – V

[Code: BS504; Course Type DSC 2E]

Physiology and Biochemistry

Periods: 45

Max. Marks: 70

UNIT – I Physiology

(15 Periods)

1.1 Digestion

- 1.1.1 Digestion definition and extra and intracellular digestion.
- 1.1.2 Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
- 1.1.3 Absorption and Assimilation of digested food; role of Gastrointestinal hormones in digestion

1.2 Respiration

- 1.2.1 Definition of Respiration and Respiratory mechanisms – External, Internal and cellular.
- 1.2.2 Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect.
- 1.2.3 Transport of CO₂ – Chloride shift; Regulation of respiration – nervous and chemical

1.3.1 Circulation

- 1.3.1 Types of circulation - Open and Closed circulation
- 1.3.2 Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic; Heart function – Conduction and regulation of heart beat.
- 1.3.3 Regulation of Heart rate – Tachycardia and Bradycardia; Blood Clotting mechanism

1.4. Excretion

- 1.4.1 Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic
- 1.4.2 Structure and function of Nephron.
- 1.4.3 Urine formation, Counter current mechanism.

UNIT – II Physiology

(15 periods)

2.1. Muscle Contraction

- 2.1.1 Types of Muscles
- 2.1.2 Ultra structure of skeletal muscle fibre
- 2.1.3 Sliding Filament theory, muscle contraction mechanism and energetics.

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

2.2. Nerve Impulse

2.2.1 Structure of Neuron

2.2.2 Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse

2.2.3 Synapse, types of synapses and Synaptic transmission.

2.3. Endocrine System

3.3.1 Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas

3.3.2 Hormone action and concept of Secondary messengers

3.3.3 Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

UNIT – III Physiology and Biochemistry

(15 periods)

3.1. Homeostasis and Enzymes

3.1.1 Concept of Homeostasis.

3.1.2 Mechanism of Homeostasis.

3.1.3 Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals

3.1.4 Enzymes: Definition, Classification, Inhibition and Regulation

3.2. Biomolecules and Metabolism

3.2.1. Carbohydrates: Classification and function of Carbohydrates

3.2.2. Carbohydrate metabolism - Glycolysis, Krebs cycle, , Electron transport and oxidative phosphorylation.

3.2.3 Proteins: Classification of proteins based on functions and Chemical nature

3.2.4 Protein Metabolism - Transamination, Deamination and Urea Cycle

3.2.5 Lipids: Classification of Lipids

3.2.6. 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 Schmidt-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. ZOOLOGY SYLLABUS UNDER CBCS

**B.Sc. III Year PRACTICAL SYLLABUS
V - SEMESTER**

**Discipline Specific Course, Paper – V
[Code: BS504; Course Type DSC 2E]
Physiology and Biochemistry**

Periods: 30

Max. Marks: 4 50

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). *Textbook 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. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year PRACTICAL MODEL PAPER

V - SEMESTER

Discipline Specific Course, Paper – V

Physiology and Biochemistry

Time:3 Hrs.

Max. Marks: 50

- | | |
|---|----|
| 1. Identification, labeled diagram and salient features of spots:
(05 spots) | 10 |
| 2. Estimation offrom Biochemistry | 10 |
| 3. Identification/Study of.....from Physiology | 10 |
| 4. Qualitative Test | 06 |
| 5. Project Work | 05 |
| 6. Certified practical record | 05 |
| 7. Viva voce | 04 |

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year

VI – SEMESTER

Discipline Specific Elective, Paper – VI

[Code: BS507; Course Type DSE 2E]

Applied Zoology

Periods: 45

Max. Marks: 70

UNIT – I

(15 Periods)

1. Aquaculture and Sericulture

- 1.1 Types of Fisheries; Fresh Water Fish and Prawn culture
- 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
- 1.6 Life cycle of *Bombyx mori*
- 1.7 Structure of silk gland and secretion of silk
- 1.8 Silkworm rearing technology.
- 1.9 Spinning, harvesting and storage of cocoons.
- 1.10 Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and prevention.
- 1.11 Prospects of Sericulture in India

UNIT – II

(15 Periods)

2. Apiculture and Vermiculture

- 2.1 Selection of Bee Species for Apiculture.
- 2.2 Bee Keeping Equipment.
- 2.3 Methods of Extraction of Honey (Indigenous and Modern).
- 2.4 Bee Diseases and Enemies.
- 2.5 Products of Apiculture Industry and its Uses (Honey, Bees Wax).
- 2.6 Introduction of Vermiculture and Vermicomposting.
- 2.7 Vermiculture techniques.
- 2.8 Bedding, Essential parameters for Vermiculture and Management
- 2.9 Methods of Harvesting (Manual & Mechanical).
- 2.10 Economic Importance of Vermiculture.

UNIT – III

(15 Periods)

3. Poultry Farming & Animal Husbandry

- 3.1 Classification of Fowls based on their use – Broilers and Commercial layers.
- 3.2 Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs.
- 3.3 Poultry diseases - Viral, Bacterial, Fungal, Protozoan

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

- 3.4 Management of a modern Poultry Farm, progressive plans to promote Poultry as a Self-Employment venture
- 3.5 Dairy farm and its management
- 3.6 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, New Delhi.
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 Approaches*. 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. ZOOLOGY SYLLABUS UNDER CBCS

**B.Sc. III Year PRACTICAL SYLLABUS
VI – SEMESTER**

Discipline Specific Elective, Paper – VI

[Code: BS507; Course Type DSE 2E]

Applied Zoology

Periods: 30

Max. Marks: 50

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 viscosity.
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. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year

V- SEMESTER

Discipline Specific Course, Paper – VII

[Code: BS604; Course Type DSC 2F]

Immunology and Animal Biotechnology

Periods: 45

Max. Marks: 70

UNIT – I Immunology – Basic concepts; antigens and antibodies

(15 Periods)

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

UNIT – II Working of an Immune system; Immune system in health and disease

(15 Periods)

- 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.
- 2.6 Introduction to Vaccines and types of Vaccines

UNIT – III Animal Biotechnology and Genetically modified organisms

(15 Periods)

- 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; applications of cell culture techniques
- 3.5 Recombinant DNA technology and its applications
- 3.6 Transgenesis – Methods of Transgenesis.
- 3.7 Production of Transgenic animals and Application of Transgenic animals in Biotechnology.
- 3.8 Stem cells –types and their applications

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

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 Schmidt-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, Mosby, 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. ZOOLOGY SYLLABUS UNDER CBCS

**B.Sc. III Year PRACTICAL SYLLABUS
V- SEMESTER**

**Discipline Specific Course, Paper – VII
[Code: BS604; Course Type DSC 2F]
Immunology and Animal Biotechnology**

Periods: 30

Max. Marks: 50

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. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year PRACTICAL MODEL PAPER

V- SEMESTER

Discipline Specific Course, Paper – VII

Immunology and Animal Biotechnology

Time: 3 Hrs.

Max. Marks: 50

- | | |
|---|----|
| 1. Identification, labeled diagram and salient features of spots:
(05 spots) | 10 |
| 2. Identification/Determination from Immunology | 10 |
| 3. Identification/Study the technique from Anima Biotechnology | 10 |
| 4. Demonstration of a technique | 06 |
| 5. Project Work | 05 |
| 6. Certified practical record | 05 |
| 7. Viva voce | 04 |

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. III Year

VI - SEMESTER

Discipline Specific Elective, Paper – VIII

[Code: BS607; Course Type DSE 2F]

AQUATIC BIOLOGY

Periods: 45

Max. Marks: 35 70

UNIT – I Aquatic Biomes

(15 periods)

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

UNIT – II Fresh Water Biology and Marine Biology

(15 periods)

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

UNIT – III Management of Aquatic Resources

(15 periods)

- 3.1 Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,
- 3.2 Eutrophication
- 3.3 Management and conservation
- 3.4 Water pollution acts of India
- 3.5 Sewage treatment and water quality assessment - BOD and COD.

B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

**B.Sc. III Year PRACTICAL SYLLABUS
VI - SEMESTER**

Discipline Specific Elective, Paper – VIII

[Code: BS607; Course Type DSE 2F]

AQUATIC BIOLOGY

Periods: 30

Max. Marks: 50

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

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(AUTONOMOUS)

NO: / BOS/zoology/acad/2019-20

DATE : 21- 10- 2019

TO

Sri. J. NARENDER REDDY,
Asst.Professor of zoology ,
K.N.M Degree College ,MLG.

Sir,

**SUB:- Nagarjuna Govt.college, Nalgonda(Autonomous)-convening the meeting of
Board of studies Zoology on 25-10-2019 Intimation-Request-Reg.**

I am happy to inform that you have been nominated as subject expert of Board of Studies in the Department of Zoology of this college for the year 2019-20.

The meeting of the Board of studies Zoology will be held on 25-10-2019 in the Department of Zoology to consider the BOS -2019-20 Agenda.

Hence you are requested to make it convenient to attend the meeting and extend your cooperation.



n-Charge/chairman BOS
ZOOLOGY DEPARTMENT

PRINCIPAL