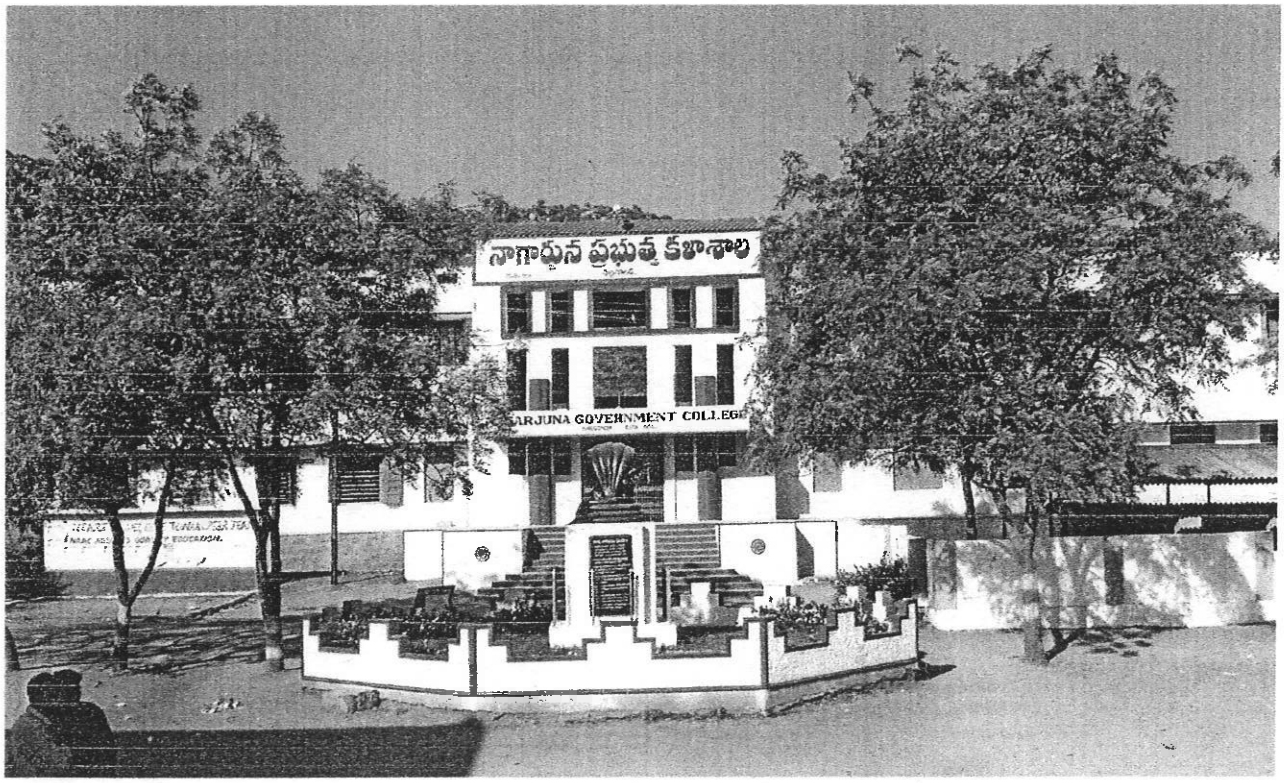
NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(Autonomous) Reaccredited by NAAC with 'A' Grade
(Affiliated to Mahatma Gandhi University)
(www.ngcnalgonda.org)

BOARD OF STUDIES 2017-18

2018 - 19



DEPARTMENT OF ZOOLOGY

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

NAGARJUNA GOVT.COLLEGE, NALGONDA (AUTONOMOUS)
DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES : 2017-2018

	CATEGORY	NAME & DESIGNATION	SIGNATURE
1	Chairman Board of studies	Kum. K.Neeraja In charge Department of zoology	
2	University Nominee	Professor B. Vanitha Das, Chairman BOS, MGU,Nalgonda	16/10/17 CHAIR PERSON Board of Studies in Zoo Osmania University, H
3	Subject expert from outside the college	1. J. Swamy Asst.Professor Department of zoology, K.R.R College ,Kodad 2. J. Narender Reddy Lecturer Department of Zoology, K.N.M, College Miryalaguda	J. NARENDER REDDY Lecturer in Zoology KNM Govt. Degree College, Miryalaguda, Nalgonda Dist. (T.S.)
4	Members: All The Faculty members of the Dept.	Dr.B.Chittaranjan Rao	
		S. Srinath Patel	
		V.Nanda Kumar	
		V.Saritha	

Submitted by

In Charge/Chairman BOS

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

J. NARENDER REDDY
Lecturer in Zoology
KNM Govt. Degree College,
Miryalaguda, Nalgonda Dist. (T.S.)

Proposals approved

Principal/ Chairman Academic council

NAGARJUNA GOVT.COLLEGE, NALGONDA

(AUTONOMOUS)

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 Kum. K.Neeraja on 16-10-2017 18-8-2018 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 2017-18. 2018-19
2. To consider and approve the choice based credit system (CBCS) and cumulative grade

   Point average (CGPA) system for the III year (V,VI semesters) students for the Academic year2017-18
3. To consider and approve the General Elective for the IV &VI Semester Students the Elective is **APPLIED ZOOLOGY**
4. To Consider and approve the continuation of Internal Assessment for the Students admitted in to I, II& III year degree course during 2017-18.
5. To consider and approve the CBCS and cumulative grade Point average (CGPA) System for the Ist & II Year Students as per the Mahatma Gandhi University new Syllabus .
6. To consider and approve to conduct year wise practical Examination for III year students and semester wise practical Examinations for the Ist & II Year student for the Year 2017-18
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 2017-18.
8. To consider and approve the model Question papers for B.Sc, I, II and III Years for the academic year 2017-18.
9. Any other related academic matter.

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Resolutions

1. Unitization of syllabus in to 4 units for each paper.
2. CBCS and CGPA system are approved.
3. APPLIED ZOOLOGY are approved as general elective in semester-IV. V
4. To conduct 2 Internal Assessments for 20 marks, one student seminar for 5 marks and one assignment for 5 marks (total 30 marks) for I , II & III year students .
5. As per MG University Ist & II & III year syllabus is approved.
6. Year wise practical examinations are approved for III year and semester wise Practical exams are approved for Ist & II & III year students.
7. List of the examiners are approved.
8. Model question papers are approved.
9. Internal examinations are conducted for 30 marks. Semester end exams are conducted for 70 marks, it is mandatory to get a minimum of 28 marks for one to get through it. On the Whole for 100 marks one must get 40 marks to get through the paper.
10. To design question pattern in the following lines for I, II and III year students.

Section –A **5 X 2=10 Marks**

- To give five very short questions and ask them to answer all questions

Section-B **4 X 5=20 Marks**

- To give Six Short questions and ask them to answer any four questions

Section-C **4 X 10 = 40 Marks**

- To give 4 Long Questions with internal choice and ask them to answer all question

1. To Prepare and supply of question banks and model papers to the students
2. Continuous Internal Assessment methods adopted to evaluate the progression of the Student.

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APPROVED THE PANEL OF EXAMINERS FOR PAPER SETTING AND EVALUATION FOR THE YEAR 2017-2018.

SNO	PAPER		NAME	DISIGNATION	CELL NO
1	I	1	J.NARENDER RDDY	Assit.Prof., K.N.M Degree colllege MLG	8374939833
2		2	SRINIVAS SHAREN	Assit.Prof., GDC. NAKREKAL	9949496795
3		3	Dr.S. NARSAIAH	Assit.Prof., GDC RAMANNAPET	9848057671
4	II	1	J.SWAMY	Assit.Prof., K.R.R Degree college KODAD	9848480243
5		2	B.SRINIVAS REDDY	Assit.Prof., GDC JADCHERLA,	9493461555
6		3	SRINIVAS SHAREN	Assit.Prof., GDC. NAKREKAL	9949496795
7	III	1	Dr.K. MADHU	Retd. PRINCIPAL	9247804932
8		2	P.PRASANNA	Assit.Prof., G.D.C. HAYATHNAGAR	
9		3	P.SURESH	Assit.Prof., GDC,JADCHARLLA,MBNR	
10	IV	1	RAMESH	Assit.Prof., SLNS YADADRI	9440926180
11		2	Dr.RAMESH BABU	Assit.Prof., GDC, SIDDIPET	9485786584
12		3	Dr.DATTATHREYA REDDY	Assit.Prof., SAP VIKARABAD	
13	V	1	Dr.K. MADHU	Retd. PRINCIPAL	9247804932
14		2	J.SWAMY	Assit.Prof., K.R.R Degree college KODAD	9848480243
15		3	Dr.J.VENKATESHWAR RAO	Assit.Prof., NIZAM COLLEGE, HYD	7723555472
16	VI	1	P.NARENDER	Assit.Prof., GDC VANAPARTHI	9440244818

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17	VI	2	Dr.K. MADHU B. chittaRanjan	Retd. PRINCIPAL	9247804932
18		3	B.BHEMLAL Naresh.	Retd. LECTURER	9290604255
19	VII	1	J.SWAMY	PRINCIPAL, GDC ,RAMANNAPET	9848385850
20		2	Dr.K. MADHU Naresh	Retd. PRINCIPAL	9247804932
21		3	Dr. B. VENKATAIAH Dr. Rajitha	Retd. LECTURER	
22	VIII	1	J.NARENDER REDDY	LECTURER .	8374939833
23		2	Dr. B. VENKATAIAH Swamy	Retd. LECTURER	9848385850
24		3	R.NARESH	Assit.Prof., K.R.R Degree college KODAD	8341695026

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B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. I Year
I - SEMESTER
Discipline Specific Course, Paper – I
[Code: BS105; Course Type DSC 2A]
Animal Diversity – Invertebrates

Periods: 60 **Max. Marks: 70**

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

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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"

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B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. I Year
ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
Discipline Specific Course, Paper – I
[Code: BS105; Course Type DSC 2A]
ANIMAL DIVERSITY - INVERTEBRATES

Periods: 30 **Max. Marks: 70**

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

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B.Sc. I Year
ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER
Discipline Specific Course, Paper – I
[Code: BS105; Course Type DSC 2A]
ANIMAL DIVERSITY - INVERTEBRATES

Time: 2 Hrs. **Max. Marks: 70** 50

1. Identification, labeled diagram and salient features of spots:	18+2=20
(7 Museum specimens + 2 slides) 8 specimens + 2 slides	
2. Dissection (one) (Diagram -02 + Dissection & Display-05)	07+3=10
3. Field Visit & Note Book	04+0=04
4. Project Work	03+0=03
5. Certified practical record	03+2=05
6. Animal Album	03+0=03
7. Viva voce	02+3=05

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B.Sc. I Year
II - SEMESTER
Discipline Specific Course, Paper – II
[Code: BS205; Course Type DSC 2B].
Ecology, Zoogeography and Animal Behavior

Periods: 60 **Max. Marks: 70**

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

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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

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B.Sc. I Year
B.Sc. PRACTICAL SYLLABUS FOR II SEMESTER
Discipline Specific Course, Paper – II
[Code: BS205; Course Type DSC 2B]
Ecology, Zoogeography and Animal Behavior

Periods: 30 **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'

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B.Sc. I Year
PRACTICAL MODEL PAPER FOR II SEMESTER
Discipline Specific Course, Paper – II
[Code: BS205; Course Type DSC 2B]
Ecology, Zoogeography and Animal Behavior

50

Time: 2 Hrs. **Max. Marks: 70**

1. Identification, labeled diagram and salient features of Spots: (06 spots) 08 Spots 8×2=16	12+4=16
2. Estimation of dissolved oxygen of a pond, (9+1=10)	09+1=10
3. Identify any **Five** Zooplankton in a given water samples	05+0=05
4. Field Visit & Note Book	04+0=04
5. Project Report	04+1=05
6. Certified practical record	04+1=05
7. Viva voce	02+3=05

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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: 70**

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

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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.

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B.Sc. ZOOLOGY SYLLABUS UNDER CBCS

B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

Discipline Specific Course, Paper – III

[Code: BS305; Course Type DSC 2C]

Animal Diversity- Vertebrates and Developmental Biology

Periods: 30 **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 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

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B.Sc. II Year

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

Discipline Specific Course, Paper – III

[Code: BS305; Course Type DSC 2C]

Animal Diversity- Vertebrates and Developmental Biology

Time: 2 Hrs. **Max. Marks: 70**

1. Identification, labeled diagram and salient features of spots: (6 Museum specimens + 2 slides)	16+4=20
2. Osteology (02 Spots)	04+0=04
3. Dissection (one) (Diagram 02 + Dissection & Display 05)	07+3=10
4. Embryology (02 Spots)	04+0=04
5. Certified practical record	04+1=05
6. Animal Album	03+0=03
7. Viva voice	02+2=04

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B.Sc. II Year
III - SEMESTER
Skill Enhancement Course
[Code: BS501; Course Type SEC-3]
Medical Diagnostics

Periods: 30 Max. Marks: 70

UNIT – 1 Introduction to Medical Diagnostics and its Importance (2 Periods)

UNIT – 2 Diagnostics Methods Used for Analysis of Blood (10 Periods)

2.1 Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain

2.2 Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

UNIT – 3 Diagnostic Methods Used for Urine Analysis (6 Periods)

3.1 Urine Analysis: Physical characteristics; Abnormal constituents

UNIT – 4 Non-infectious and Infectious Diseases (9 Periods)

4.1 Non-infectious diseases - causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

4.2 Infectious diseases - causes, types, symptoms, complications, diagnosis and prevention of Tuberculosis and Hepatitis

UNIT – 5 Tumours and Medical imaging (3 Periods)

5.1 Tumors: Types (Benign/Malignant), Detection and metastasis

5.2 Medical imaging: X-Ray of bone fracture, PET, MRI and CT Scan (using photographs).

Suggested Readings

Prakash, G. (2012). Lab Manual on Blood Analysis and Medical Diagnostics. S. Chand and Co. Ltd., New Delhi

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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: 70**

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.

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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'

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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: 70**

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.

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B.Sc. II Year

B.Sc. PRACTICAL MODEL PAPER FOR IV SEMESTER

Discipline Specific Course, Paper – IV

[Code: BS405; Course Type DSC 2D]

Cell Biology, Genetics and Evolution

Time:2 Hrs. **Max. Marks: 70**

1. Identification, labeled diagram and salient features of spots: (06 spots)	12	18
2. Prepare and Identify Mitotic divisions with onion root tips:	08	10
3. One Problem from Genetics	05	5
4. One Problem from Evolution	05	5
5. Certified practical record	05	5
6. Album	03	2
7. Viva voce	02	5

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B.Sc. II Year
IV - SEMESTER
Skill Enhancement Course
[Code: BS401; Course Type SEC-2]
Aquarium Fish Keeping

Periods: 30 **Max. Marks: 70**

UNIT – 1 Introduction to Aquarium Fish Keeping **(6 Periods)**

1.1 The potential scope of Aquarium
1.2 Fish Industry as a Cottage Industry
1.3 Exotic and Endemic species of Aquarium Fishes

UNIT – 2 Biology of Aquarium Fishes **(10 Periods)**

2.1 Common characters and sexual dimorphism of Freshwater and Marine Aquarium fishes – 1: Guppy, Molly, Sword tail, Gold fish, and Angel fish
2.2 Common characters and sexual dimorphism of Freshwater and Marine Aquarium fishes – 2: Blue morph, Anemone fish and Butterfly fish

UNIT – 3 Food and feeding of Aquarium fishes **(4 Periods)**

3.1 Use of live fish feed organisms
3.2 Preparation and composition of formulated fish feeds

UNIT – 4 Fish Transportation **(4 Periods)**

4.1 Live fish transport - Fish handling, packing and forwarding techniques
4.2 Preparation and composition of formulated fish feeds

UNIT – 5 Maintenance of Aquarium **(6 Periods)**

5.1 General Aquarium maintenance
5.2 Budget for setting up an Aquarium Fish Farm as a Cottage Industry

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B.Sc. II Year
IV - SEMESTER
Skill Enhancement Course
[Code: BS301; Course Type SEC-1]
Apiculture

Periods: 30 **Max. Marks: 70**

UNIT – I Biology of Bees **(4 Periods)**

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

UNIT – 2 Rearing of Bees **(10 Periods)**

2.1 Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth
2.2 Bee Pasturage
2.3 Selection of Bee Species for Apiculture
2.4 Bee Keeping Equipment
2.5 Methods of Extraction of Honey (Indigenous and Modern)

UNIT – 3 Diseases and Enemies of Bees **(5 Periods)**

3.1 Bee Diseases and Enemies
3.2 Control and Preventive measures

UNIT – 4 Bee Economy & Entrepreneurship in Apiculture **(6 Periods)**

4.1 Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen, etc.
4.2 Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial
4.3 Beehives for cross pollination in horticultural gardens

SUGGESTED READINGS

Prost, P. J. Apiculture. Oxford and IBH, New Delhi.

Bisht D.S., Apiculture, ICAR Publication.

Singh S., Beekeeping in India, Indian council of Agricultural Research, New Delhi

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B.SC III YEAR SYLLABUS THEORY 2016-17

SEMESTER- V CORE ANIMAL PHYSIOLOGY

THEORY PAPER –V

UNIT I

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.

1.5 Types of respiration – external and internal respiration

Physiology of respiration

.1.6 Structure of mammalian lungs and gaseous exchange.

1.7 Transport of oxygen – formation of oxyhaemoglobin and affinity of haemoglobin for Oxygen, Oxygen dissociation curves.

1.8 Transport of CO_2 – Chloride shift, Bohr effect.

1.9 Cellular respiration – Main steps of glycolysis, Kreb's cycle, electron transport, Oxidative phosporylationa and ATP production (Chemosmotic theory).

UNIT II

2.0. Physiology of Circulation

2.1 Open and closed circulation.

2.2 Structure of mammalian heart and its working mechanism – Heartbeat and cardiac cycle. Myogenic and neurogenic hearts.

2.3 Regulation of heart rate – Tacchycardia 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 Gross organization of mammalian excretory system and structure of kidney.

2.7 Structure and function of Nephron – Counter current mechanism.

UNIT III

3.0. Physiology of muscle contraction

3.1 Gneral structure and types of muscles.

3.2 Ultra structure of skeletal muscle.

3.3 Sliding filament mechanism of muscle contraction.

3.4 Chemical changes during muscle contraction – role of calcium,ATP utilization and its replenishment.

UNIT IV

Physiology of nerve impulse

3.5 Structure of nerve cell.

3.6 Nature of nerve impulse – resting potential and action potential. Properties of nerve impulse – threshold value, refractory period, all or none response.

3.7 Conduction of nerve impulse along an axon – local circuit theory and salutatory conduction theory.

3.8 Structure of synapse, mechanism of synaptic transmission – electrical and chemical

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B.SC III YEAR SYLLABUS THEORY 2016-17

SEMESTER- VI ADVANCE ELECTIVE I APPLIED ZOOLOGY AQUACULTURE AND HEMATOLOGY

THEORY PAPER –VI

UNIT I

1.0. Fisheries

1.1. Capture fisheries – Introduction
1.2. Types of fisheries, Fishery resources from Freshwater, Brackish water and Marine habitats.
1.3. Finfish and shell fisheries. 1.4. Fishing gears and fishing crafts.

UNIT II

Aqaculture

2.1. Freshwater, Brackish water and Mariculture.
2.2 Site selection criteria.
2.3 Aquaculture systems
2.4. Induced breeding.
2.5 Hatchery design and Management seed transportation

2.6 Larval rearing – Nursery ponds, rearing and grow out ponds
2..7 Shrimp and Prawn culture
2.8Hatchery systems, Seed transport, common diseases and control

UNIT III

Harvesting Technology
3.1 Hatchery systems
3.2. Post-harvest technology
3.3 Preservation and processing – Freezing, solar drying, Canning, salting smoking, By product of fish cool miner

UNIT IV

Hematology 8 hours
4.1. Blood composition and functions
4.2. Blood groups and transfusion problems
4.3. Blood diseases -- Anemia, Leukemia, Leucocytosis, Leucopenia
4.4. Biopsy and – Clinical importance.
4.5. autopsy – Clinical importance.

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B.SC IIIYEAR SYLLABUS THEORY 2016-17

SEMESTER- VII CORE ANIMAL PHYSIOLOGY,GENETICS &EVOLUTION

THEORY PAPER –VII

UNIT I

1.0. Physiology of Endocrine system

1.1 Relationship between hypothalamus and pituitary gland.

1.2 Hormones of hypothalamus.

1.3 Hormones of Adenohypophysis and Neuro hypophsis.

1.4 Hormones of pineal gland, thyroid gland, parathyroid, thymus, adrenal and pancreas.

1.5 Endocrine control of mammalian reproduction – Male and female hormones – Hormonal control of menstrual cycle in humans

UNIT II.

Physiology of Homeostatis

2.1 Concept of homeostasis and its basic working mechanism.

2.2 Mechanism of Homeostasis – giving three illustration viz., Hormonal control of glucose levels, Water and ionic regulation by freshwater and marine animals and temperature regulation in man.

UNIT III

3.0. Genetics

3.1. Mendel's laws – Law of segregation and independent assortment;

3.2. Genetic interactions –Incomplete dominance, co dominance and epitasis.

3.3. Identification of DNA as the genetic material – Griffith's experiment and Hershey – Chase

experiment. 2.4. Central dogma of molecular biology – Brief account of DNA replication (Semiconservative

method), Replication fork (Continuous and discontinuous synthesis);

3.4. Transcription – Brief account initiation, elongation and termination in eukaryotes;

3.5. Translation; Genetic code; gene regulation as exemplified by lac operon.

UNIT IV

4.0. Organic Evolution:

4.1 Human karyotyping, barr bodies and Lyon hypothesis and Amniocentesis chromosomal disorders – Autosomal and sex chromosomes

4.2 Genetic basis of Evolution, Gene pool and gene frequencies, Hardy-Weinberg's Law, Force of destabilization, natural selection, genetic drift, Mutation, Isolation and Migration.

4.3. Speciation – Allopatry and sympatry.

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SEMESTER- VIII ADVANCE ELECTIVE

(IMMUNOLOGY,PARASITOLOGY&ANIMAL BIOTECHNOLOGY)

THEORY PAPER –VIII

UNIT –I

1.0 Immunology

1.1. Types of immunity – Innate and acquired

1.2. Antigens – Haptenes and epitopes and their properties

1.3. Structure and biological properties of human immunoglobulin G (IgG)

1..4. Hypersensitivity – immediate and delayed

UNIT –II

2.1. Blood parasites (structure and Clinical significance of *Plasmodium*).

2.2 Intestinal parasites – Structure and clinical significance *Entamoeba, Giardia, Taenia solim, Ancylostoma, Enterobius*

UNIT –III

.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

UNIT –IV

Aimal biotechnology

4.1 Transgenic Animal

4.2. Transgenesis and Production of transgenic animals (Fish and Goat).

4.3 Application of Stem Cell technology in cell based therapy (Diabetes and Parkinson's diseases)

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PRACTICAL PAPER – III

ANIMAL PHYSIOLOGY, GENETICS & EVOLUTION

90 hrs
(3 hrs/ week)

ANIMAL PHYSIOLOGY

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

GENETICS:

5. A, B, O blood group identification.
6. Problems based on Blood grouping.
7. 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]
8. Identification of genetic syndromes given on charts.
9. Problems based on Mendelian inheritance [at least one problem for each for the laws of segregation and law of independent assortment].

REFERENCE BOOKS

1 'Essentials of 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.

7'Biology: The Science of Life' by R.A. Wallace, G.P. Sanders & R.J. Ferl.

8'Biology: Concepts and Applications' by Starr

9'Genetics' Vol-I. by C.B.Powar., Himalaya Publishing House Pvt.Ltd.

10'Genetics' by Strickberger.

11'Genetics' by P.K. Gupta.

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B.Sc III-ZoologyPAPER- V

GENETIC ENGINEERING(CBCS)(Advanced Elective-II)

60 hrs
(3 hrs/ week)

1 Recombinant DNA Technology

1.1 Enzymes used in gene cloning : Restriction endonucleases, Ligases, Phosphatases, Methylases, Kinases

1.2 Cloning vehicles – Plasmids, Cosmids, Phage vectors, Shuttle vectors, Baculovirus vector system.

1.3 Construction of genomic and cDNA libraries

2Applications in rDNA Technology

2.1 Identification of cloned genes

2.2 Application in genetic engineering –HUMILLIN, SOMTOSTATATIN,GOLDEN RICE with Vitamin A

2.3 Recombinant vaccines productions

3Virology

3.1 Structure and composition of viruses.

3.2 One-step growth and determination of plaque forming units (PFU).

3.3 Isolation and cultivation of bacterial plaques.

3.4 Lytic and lysogenic life cycle of λ-phage.

3.5 TMV, Retro viruses- HIV.

3.6 Prions and Mycoplasma

Practicals

1. Immuno-diffusion test
2. ELISA Test
3. Microagglutination using microtiter plates (eg. ABO and Rh Blood grouping)
4. Viability tests of cells/bacteria (Evans blue test or Trypan blue test)
5. Coomb's test

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Recommended Books

1. Genetic Engineering - By R. Williamson, Publ: Academic Press
2. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan& C. Subramanyan, Publ: Macmillan India
3. Microbial Genetics - By S.R. Maloy, J.E. Cronan& D. Freifelder, Publ: Jones &Barlett
4. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
5. Genes - By B. Lewin - Oxford Univ. Press
6. Molecular Biology &Biotechnol. - By H.D. Kumar, Publ: Vikas
7. Immunology - By G. Reever& I. Todd, Publ: Blackwell
8. From Genes to Clones - By E.L. Winnacker, Publ: Panima, New Delhi
9. Methods for General & Molecular Bacteriology - By P. Gerhardf et al., Publ: ASM
10. Molecular Biotechnology - By G.R. Click and J.J. Pasternak, Publ: Panima
11. Recombinant DNA - By J.D. Watson et al., Publ: Scikentific American Books
12. Immuno diagnostics - By S.C. Rastogi, Publ: New Age
13. Molecular Biology - By D. Freifelder, Publ: Narosa
14. Genes and Genomes – By Maxine Singer and Paul Berg
15. Cell and Molecular Biology - By S.C. Rastogi
16. Genetic Engineering and Biotechnology - By V. Kumar Gera
17. Essentials of Biotechnology – By P.K. Gupta
18. Immunology - By Kubey
19. Gene Biotechnology - By Jogdand
20. Genome - T.A. Brown
21. Gene Cloning - T.A. Brown

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10. 'Genetics' by Strickberger.
11. 'Genetics' by P.K. Gupta.
12. ' Cell Biology, Genetics, Evolution and Ecology' by P.S.Varma and V.K. Agrawal; S. Chand and Company.
13. 'Principles of Genetics' by S.B.Basu and M.Hossain.
14. 'Principles of Genetics' by Gardner, Simmons & Smustard.
15. 'Principles of Genetics' by H. Robert & Tamasin.
16. 'Genetics' by P.S.Verma & V.K.Agarwal.
17. 'Organic Evolution' by M.P.Arora & Chandrakanta.
18. 'Organic Evolution' by N.Arumugam.
19. ' Animal nutrition' by P.Mc Donald, R.A. Edwards, J.F.D. Greenhalgh, C.A. Morgan.

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B.SC III YEAR SYLLABUS THEORY 2016-17
SEMESTER- VI ADVANCE ELECTIVE AQUACULTUREAND PARASITOLOGY

PRACTICAL PAPER –VI

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
certified field note book should be submitted at the time of practical examination.

CLINCIAL SCIENCE:

1.0. Identification of the following protozoan parasites.
a) Entamoeba histolytica
b) Giardia intestinalis
c) Balantidium coli
d) Trypanosoma gambiense
e) Plasmodium – Any two stages

2.0. Identification of the following helminth parasites.
a) Taenia solium
b) Ascaris (Male and female)
c) Enterobius vermicularis
d) Dracanculus medinenesis
e) Ancylostoma duodenale

CLINICAL SCIENNCE

1. Blood cell counting – RBC and WBC
2. Estimation of Haemoglobin (Sahi's Method)

ANIMAL BIOTECHNOLOGY:

1. Identification of vectors (charts or photographs)
2. Identification of Genetic disorders (charts or photographs)
Identification of transgenic animals (charts or photographs)

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(AUTONOMOUS)
B.Sc III-Zoology PAPER- VI
ENVIRONMENTAL BIOTECHNOLOGY:(ADVANCED ELECTIVE-II)

60hr
(3hrs/ week)

Unit I:Biological Treatment of Wastewater – Aerobic System

Biological processes for domestic and industrial waste water treatments; Aerobic systems - activated sludge process, trickling filters, biological filters, rotating biological contractors (RBC), Fluidized bed reactor (FBR), expanded bed reactor, Inverse fluidized bed biofilm reactor (IFBBR) packed bed reactors air- sparged reactors, Biological Treatment of Wastewater – Anaerobic System

Unit II: Bioremediation

Introduction, constraints and priorities of Bioremediation, Biostimulation of Naturally occurring microbial activities, Bioaugmentation, in situ, ex situ, intrinsic & engineered bioremediation,Solid phase bioremediation - land farming, prepared beds, soil piles, Phytoremediation

Unit III: Metal Biotechnology

Mining and Metal biotechnology – with special reference to Copper & Iron. Microbial transformation, accumulation and concentration of metals, metal leaching, extraction and future prospects.

Bio Fuels

Microorganisms and energy requirements of mankind; Production of nonconventional fuels - Methane (Biogas), Hydrogen, Alcohols and algal hydrocarbons,
Use of microorganisms in augmentation of petroleum recovery.

Unit IV: Hazardous Waste Management- I

Introduction - Xenobiotic compounds, recalcitrance. hazardous wastes - biodegradation of Xenobiotics . Biological detoxification - market for hazardous waste management –

Hazardous Waste Management- II

biotechnology application to hazardous waste management - examples of biotechnological applications to hazardous waste management - cyanide detoxification - detoxification of oxalate, urea etc. - toxic organics - phenols.

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TEXT BOOKS:

1. Environmental Biotechnology by S. K. Agarwal
2. Biodegradation & Bioremediation (1999), Martin Alexander, Academic press.

REFERENCES:

1. Stanier R. Y., Ingram J.L., Wheelis M.L., Painter R.R., General Microbiology, McMillan Publications, 1989.
2. Foster C.F., John Ware D.A., Environmental Biotechnology, Ellis Horwood Ltd., 1987.
3. Karrely D., Chakrabarty K., Omen G.S., Biotechnology and Biodegradation, Advances in Applied Biotechnology Series, Vol.4, Gulf Publications Co. London, 1989.
4. Bioremediation engineering; design and application 1995 John. T. cookson, Jr. Mc Graw Hill, Inc.
5. Environmental Biotechnology by A.K. Chatterjee
6. Environmental Biotechnology by S.N.Jogdand Himalaya Publishing

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B.Sc., Zoology

Semester-I,

Model Question Paper

Time:2 ½ hour Marks:70

Section-I

Answer all the questions 5x2=10

1. Name different cells of Porifera
2. What is Polymorphism? Give two examples.
3. What are the controlling measures for dracunculosis?
4. How many types of true coelom exists? Name them with examples.
5. Hemichordata divided into how many classes and what are they and give examples

Section-II

Answer any four of the following questions 4x5=20

6. Classify kindom animalia.
7. Explain life cycle of Elphidium
8. Draw a neat labled diagram of Nematocyst.
9. Give prophylaxis for controlling schistosoma
10. What are the affinities of peripatus.
11. Explain pearl formation.

Section-III

Answer all the questions

Draw diagrams where ever neccessaary 4x10=40

12. Write about locomotion in Protozoa

    Or

    Explain canal system in sponges
13. Give a note on the life cycle of Schistosoma haemotobium

    Or

    Explain corla reef formation
14. Explain different types of Mouth parts in class Insecta

    Or

    What is metamerism? Explain its evolutionary significance.
15. Write about Water vascular system in sea star

    Or

    What are the characters of Balanoglossus and explain its affinities.

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B.Sc., Zoology

Semester-II,

Model Question Paper

Time:2 ½ hour Marks:70

Section-I

Answer all the questions

5x2=10

1. What is ecology.
2. What is ecosystem? Give few examples for ecosystem.
3. What is population growth curve? How many types are there draw them
4. What is discontinuous distribution?
5. What is pheromone? Give two examples for it.

Section-II

Answer any four of the following questions

4x5=20

6. What is food web? Explain with an example.
7. Explain ecological succession.
8. What is green house effect? Explain
9. Name national parks and sanctuaries in India.
10. What is Wallace line? Explain
11. How do you explain social behaviour in animals?

Section-III

Answer all the questions

Draw diagrams where ever neccessaary

4x10=40

12. Give an account on aquatic ecosystem.

    Or

    What is biogeochemical cycles? Explain Nitrogen cycle.
13. What is environmental pollution? What are the sources, effect and control measures of air pollution?

    Or

    List the endangered species in india. Give the reasons for this condition.
14. Explain different zoogeographical regions.

    Or

    Explain continenetal drift.
15. What are the different types of behaviour in animals?

    Or

    Write about physiology and phylogony of learning in animals.

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Faculty of Science

B.Sc. **I/II/III/IV/V&VI** Semester Examination,

ZOOLOGY MODEL PAPER (CBCS)

Time: 2 ½ Hrs. Max.Marks: 70

SECTION - A (5x 2 = 10)

Answer the following questions. (At least one question from each Unit)

1.

2.

3.

4.

5.

SECTION - B (4 x 5 = 20)

Answer any FOUR of the following questions. (At least one question from each Unit)

6.

7.

8.

9.

10.

11.

SECTION - C (4 x 10= 40)

Answer the following questions.

12. (a) Unit - I

(OR)

(b) Unit - I

13. (a) Unit - II

(OR)

(b) Unit - II

14. (a) Unit - III

(OR)

(b) Unit- III

15. (a) Unit - IV

(OR)

(b) Unit - IV

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FACUTLY OF SCIENCE

BS c III YEAR V SEMISTER –END EAMINATIONS

ANIMALPHYSIOLOGY PAPER V

TIME :2.30MIN MAX MARKS 70

I Answere the following questions 5x2=10

1) Bhoreffect, chloride shift
2) What are chylomicrons
3) Iso tonic, Isometric muscle contractions
4) Columns of Bethini and Belliniducts
5) What are neurtransmiteers

II Answerer any four of the following questions 4x5=20

6) How many types of digestion explain with examples
7) Write in detailed about transport of CO2
8) What are the chemical reaction in muscle contraction
9) How many types of circulation are thare explain ir
10) Draw a well labelled diagram of heart
11) Draw a diagram of Nephron

III Answer the following questions 4x10=40

9) Cellulose digestion

OR

Write about carbohydrates and protein digestion

10) Glycolysis

OR

Krebs cycle

11) Write about working mechanism of heart

OR

Counter current mechanism

15) Write about sliding filament theory

OR

Synoptic transmissin

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GENETIC ENGINEERING (CBCS)(Advanced Elective-II)

MODEL QUESTION PAPER -PAPER- V

III YEAR (ADVANCED ELECTIVE-I)

TIME 2.30 hrs **MARKS: 70**

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS **5X2=10**

1.Methylase
2.PBR322
3.Southern blotting
4.Golden rice
5.Thymus

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4X5=20**

1.Palindromic sequences
2.Somatostatin
3.Hapten
4.MHC Complexes
5.Rheumatoid Arthritis
6.Prions & Mycoplasma

SECTION –C

III.ANSWER THE FOLLOWING QUESTIONS **4X10=40**

1 a.)Write the role of restriction endonuclease enzyme in gene cloning.?

Or

b.)Write the brief an account on construction of recombinant DNA.?

2. a.) Explain about the Recombinant vaccines and its production?

Or

b.) Applications of rDNA technology in Genetic engineering?

3.a.)Write the physico-chemical properties of Antigens?

Or

b.)What is Hypersensitivity-Explain its type with examples ?

4.a.)Explain Isolation and cultivation of plaques?

Or

b.)what is Retro virus?Explain HIV replication with neat diagram?

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BSc III YEAR V SEMISTER –END EAMINATIONS

APPLIED ZOOLOGY PAPER VI

TIME :2.30MIN MAX MARKS 70

I Answer the following questions 5x2=10

1) Marine pelagic fish
2) Katamarans
3) Mari culture
4) Write the composition of blood
5) Biopsy

II Answer any four of the following questions 4x5=20

6) Describe the fin fisheries
7) Aquaculture systems
8) Write an easy on carp jar hatchery
9) Viral diseases in culture ponds
10) List out the by products of fishes
11) Explain the functions of different WBC

III Answer the following questions 4x10=40*

12) Write about fishing crafts

OR

Write about fishing gears

13) Write in detail the culture of shrimps

OR

Write an easy on preserving methods of fishes

14) Give an account on carp induced breeding in carps

OR

Write an easy on site selection for finger links and adult fishes

15) Write an easy on anaemia

OR

Describe the blood composition and functions

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BS c III YEAR V SEMISTER –END EAMINATIONS

ANIMALPHYSIOLOGY PAPER VI

TIME :2.30MIN MAX MARKS 70

I Answere the following questions 5x2=10

1) Neuro hypophysis
2) Melatonin
3) Alleles
4) Barrbodies
5) Eurihaline and stenohaline animals

II Answerer any four of the following questions 4x5=20

6)Adrenal gland

7)Thyroxin hormonal disorders

8)Write about hormonal regulations in marine fishes

9) Mendelein principles
10) Banding Techniques
11) Transformation theory

III Answer the following questions 4x10=40

12) Adenohypophysial hormones

OR

Write about hormonal control in reproduction

13) Write an essay on thermo regulation in humans

OR

Define homeostasis and explain the same in different organisms

14) Gene regulation in prokaryotes

OR

D.N.A Replication

15) Write about autosomal disorders

OR

Write about Allosomal disorders

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MODEL QUESTION PAPER

B.Sc III-BiotechnologyPAPER- VI

ENVIRONMENTAL BIOTECHNOLOGY(ADVANCED ELECTIVE-II)

TIME 2.30 hrs **MARKS: 70**

SECTION-A

I.ANSWER THE FOLLOWING QUESTIONS **5X2=10**

1. Waste water Treatment.
2. Fluidised bed reactor
3. Palindromic repeats
4. Bioaugmentation
5. Metal leaching

SECTION-B

II.ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS **4X5=20**

6. Write in detail about the waste water treatment in aerobic system.
7. Write about Bioremediation.
8. Describe the process of mining and extraction of iron
9. write the petroleum recovery methods.
10. what are biofuels and their importance.
11. write the anerobic system of waste water treatment.

SECTION –C

III.ANSWER THE FOLLOWING QUESTIONS

4X10=40

12.a.).Describe the process of domestic and waste water treatment?

Or

b.)Write the Biological Treatment of Wastewater – Anaerobic System?

13.a.)Write in detail about constraints and priorities of Bioremediation?

Or

b.)Define Solid phase bioremediation and its procedures?

14.a.)Describe the Mining of copper?

Or

b.)write in detail about Microorganisms and energy requirements of mankind fuels – Methane (Biogas)?

Or

15.a.)Define Biological detoxification and its methods?

b.)Write in detail about detoxification of oxalate, urea

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BSc III YEAR V SEMISTER –END EAMINATIONS

IMMUNOLOGY AND ANIMALBIOTECHNOLOGY PAPER VIII

TIME :2.30MIN MAX MARKS 70

I Answer the following questions 5x2=10

1) Antigens
2) Pagocytosis
3) LDL HDL
4) Parkinsons disease
5) What is diabetic keto acidosis

II Answer any four of the following questions 4x5=20

6) Haptons
7) Antibody dependent cytotoxic hypersensitivity
8) Erithoblastosis foetalis
9) What are the essential factors for antigeniciti
10) Entomoeaba histolitica
11) Functions of cholesterol
12) Classified the plasmids and write pBR 322

III Answer the following questions 4x10=40

13) What is immunity ? Describe the innate and acquired immunity

OR

Describe the structure of immunoglobulin Ig G and write properties.

14) Explain the structure and clinical significance of plasmodium

OR

Write about two intestinal parasites.

15) Describe briefly the scope of Biotechnology .

OR

What is gene cloning ? briefly describe

16)What is transgenesis ? Briefly write about it in fishes

OR

Explain briefly about the application of stem cells in diabetes

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