

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE,
VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS)**

DEPARTMENT OF ZOOLOGY

2018-2019



BOARD OF STUDIES




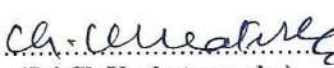

Minutes of Meeting

09-04-2018

Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 AM on 09-04-2018 in the Department of Zoology.

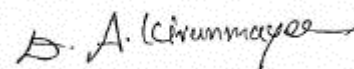
Smt.D.A. Kiranmayee. ... Presiding

Members Present:

- 1)  Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee. 9/4/18) A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2).....  University Nominee Professor Dept. of Zoology,
(Prof.B.V.Sandeep.) Andhra University,
Vizag
- 3).....  Academic Council Head, Department of Zoology,
(Smt. D.Uma.) Nominee S.D.M.S.College,(Autonomous)
Vijayawada.
- 4).....  Academic Council Head, Department of Zoology,
(Sri.Ch.Venkateswarlu.) Nominee P.B. Siddhartha College,
Vijayawada.
- 5).....  Member Lecturer in Zoology,
(kum.M.Lakshmi Priyanka.) A.G& S.G.S Degree College of
Vuyyuru-521165.

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for Semesters I & II of I B.Sc (BZC) in the academic year 2018-19.
2. To recommend the syllabi (Theory & Practical), Model question paper ,for III & IV Semesters of II B.Sc(BZC) for the academic year 2018-19.
3. To recommend the syllabi (Theory & Practical), Model question paper for V & VI Semesters of III B.Sc(BZC) for the academic year 2018-19.
4. To discuss to the syllabus of Elective& Clusters in VI semester for the academic year 2018-19.
5. To recommend the Guide lines to be followed by the question papers setters in Zoology for I,II,III,IV,V&VI Semester –End exams.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status
7. Any other matter.



Chairman.

RESOLUTIONS

1. It is resolved to continue the same syllabi (Theory & Practical), and model question paper for Zoology I & II semesters of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS) approved by the Academic Council of 2018 – 19.
2. It is resolved to implement the same syllabi (Theory & Practical), model question paper under Choice Based Credit System (CBCS) setters of Zoology of III & IV semesters of II B.Sc. (B.Z.C) ..
3. 4. It is Resoled to follow Elective-A (Immunology) and Cluster –B (Aquaculture) in VI Semester from the Academic year 2018-19.
5. It is resolved to Continue the same Blue prints and guidelines for the paper setters of I,II,III,IV,V & VI Semesters of B.Sc Zoology for the Academic year 2018-19.
6. It is resolved to continue the following teaching and evaluation methods for the Academic year 2018-19.
7. It is resolved to conduct Certificate Course in Organic farming for BA, B.Com and B.Sc. students.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology using of LCD projector to display on U boards etc; for better understanding of concepts.

Evaluation of a student is done by the following procedure

- There are two components in the Valuation and Assessment of a student – Internal Assessment (IA) and Semester Examinations (SE).
(For the Batch of Students Admitted from 2018-2019 – UG)

Internal Assessment (IA)

- The maximum mark for IA is 30 and SE is 70 for theory; and for practical papers 50.
- Each IA written examination is of 1 hour's duration for 20 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks.
- Other Innovative Components will be for 5 Marks. The innovative component is for 5 marks, conducted during the class hours by the staff member/ in charge of the subject, in the form of assignments/ quiz/ seminars /ppt/Online- assignments/Open Book/Viva Voce/ Group work/ Mini Project/ Exhibition, etc. The topic and time for submission/ presentation will be announced by the staff member/ in charge of the subject in advance. Each student should explain and defend his/her presentation. For attendance 5 Marks are allotted.
- The semester examination will be of 3 hours with maximum 70 marks.
- There is no pass minimum for IA.

Semester Examinations (SE)

- A student should register himself/herself to appear for the Semester Examinations by payment of the prescribed fee.
- The Semester Examinations will be in the form of a comprehensive examination covering the entire syllabus in each subject. It will be of 3 hours duration & Foundation course 2 hours irrespective of the number of credits allotted to it.
- If a candidate fails to obtain pass marks even after the due to less mark in the IA examination, the marks of the next examination will be converted to be out of 100.

- Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/she gets 40/70) and the result shall be declared as 'PASS'
- The maximum marks for each Paper shall be 100.

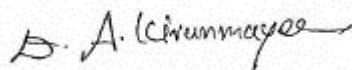
Evaluation of a student is done by the following procedure:

I. Internal Assessment Examinations:

- Out of maximum 100 marks in each paper, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, 15 marks are allocated for announced tests. Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance, 5 marks for seminars & remaining 5 marks for assignments to the Semesters I, II, III & IV. For the V & VI semesters it is resolved to continue the same as approved by Academic Council in 2014 -15.

II. Semester-End Examinations:

- The maximum marks for I, II, & III B.Sc Semester-End examinations shall be 75 marks and duration of the examination shall be 3 Hours.
- Semester-End examinations shall be conducted in theory papers at the end of every semester while in practical papers, these examinations are conducted at end of I, II, III, IV & VI semesters.
- Discussed and recommended for organizing Seminars, Guest lectures, Work-shops to upgrade the knowledge of students, for the approval of the Academic Council.



Chairman

ZOOLOGY

I B.Sc .

PAPER-I

Semester – I w.e.f. 2017 – 2018

(Code: Zoo-101C)

Credits : 3

Max.Marks : 75

Title of the paper: **Biology of Non – Chordates.**

60 hrs.(4hrs/week)

UNIT- I

10hrs

1.1: Significance of Diversity of Invertebrates.

1.2: **Phylum - Protozoa :**

1.2.1: Type study: Elphidium.

1.3: **Phylum - Porifera :**

1.3.1: Type study: Sycon - Morphology, histology, spicules.

1.3.2: Canal system in Sponges.

UNIT- I 16hrs.

2.1 **Phylum - Coelenterata :**

2.1.1: Type study :Obelia - Morphology, Structure of Polyp & Medusa.

2.1.2: Polymorphism in Coelenterates.

2.1.3: Coral & Coral reef formation.

2.2 **Phylum- Platy helminthes:**

2.2.1: Type study: Fasciola hepatica – Morphology, Excretory system, Reproductive system, Life history & Pathogenicity.

2.3 **Phylum - Nemathelminthes:**

2.3.1: Type study: Ancylostomaduodenale - Morphology & Life history .

UNIT-III 10 hrs.

3.1 **Phylum - Annelida:**

3.1.1: Type study: Hirudinaria granulose – Morphology, Digestive system, Excretory system & Reproductive system.

3.1.2: Coelome & Coelomoducts.

3.1.3: Vermiculture: Scope, Significance of Vermiculture, Earthworms Sps, Processing of Vermiculture, Vermicompost, and Economic Importance of Vermicompost.

UNIT-IV 15hrs.

4.1: **Phylum - Arthropoda :**

4.1.1: Type study : Prawn – External characters [Except appendages], Respiratory system & Circulatory system.

4.1.2: Peripatus : Structure & affinities.

4.2: **Phylum - Mollusca:**

4.2.1 Pearl Formation in Pelecypoda.

4.2.2 : Torsion in Gastropoda.

UNIT- V 9hrs.

Phylum - Echinodermata :

5.1.1 : Water vascular system of Star Fish.

5.2 **Hemichordata** : Balanoglossus : Structure , Affinities.

5.3. **Invertebrates Larval forms:** Amphiblastula, Ephyra, Trochophore, Nauplius, Glochidium, Bipinnaria, Tornaria

Reference Books :-

1. Modern Text Book of Zoology Invertebrates.....R.L.Kotpal
2. A Text Book of Invertebrates Arumugam et.al.,
3. Economic Zoology Saras Publication

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Semester - I

Zoology – I

(Model question paper)

Code – Zoo-101C Title of the paper: Biology of Non – Chordates.

Time : 3hrs.

Max. Marks : 75.

Section – A

5 x 5= 25. Answer any

five questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Section – B 5 x 10=50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru,(Autonomous)
Semester – I**

Zoology – I

Guide lines to the Paper Setter

Title of the paper:

Biology of Non – Chordates.

Code – Zoo-101C

Time : 3hrs.

Max. Marks : 75.

Note :1. Answer any **five** questions out of eight in Section – A

Each question carries **five** marks $5 \times 5 = 25M$.

2. Answer any **five** questions out of eight in Section – B. Each question carries Ten marks.

$5 \times 10 = 50M$.

	Section	UNIT-I (Protozoa - Porifera)	UNIT-II (Coelenterata- Nematelminthes)	UNIT-III (Annelida)	UNIT-IV (Arthropoda – Mollusca)	UNIT-V (Echinodermata- Hemichordata)
5 Marks Questions	A	1	2	2	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		25	30	20	15	20

Note: 1.Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

ZOOLOGY
PRACTICAL - I

w.e.f. 2017-2018.Code :Zoo- 101P

MAX.MARKS : 50.

(2hrs/week)

Biology of Non – Chordates.

1.INVERTEBRATES : Observation of the following slides/ specimens / models.

Protozoa – General characters & Outline classification upto Classes with examples.

Elphidium, Paramecium –binary fission & Conjugation.

Porifera -General characters & Outline classification upto Classes with examples

Spongilla, Euspongia, Sycon, Sycon – L.S, T.S.

Coelenterata - General characters & Outline classification upto Classes with examples.

Obelia Colony , Medusa, Physalia, Velella, Corallium, Gorgonia, Aurelia, Pennatula

Platyhelminthes - General characters & Outline classification upto Classes with examples

. Planaria, Larval stages of Fasciola – Miracidium, Redia, Cercaria, Echinococcus
granulosus

Nemathelminthes - General characters & Outline classification upto Classes with examples.

Ascaris male & female, Ancylostoma duodenale.

Annelida -General characters & Outline classification upto Classes with examples.

Neries, Heteroneries, Aphrodite, Hirudo, Trochophore Larva.

Arthropoda - General characters & Outline classification upto Classes with examples.

Mouth parts of male & female Anopheles& Culex, Mouth parts of House fly,
Nauplius , Mysis , Zoea Larvae. Scorpion, Crab, Prawn ,Scolopendra, Sacculina
Limulus, Peripatus.

Mollusca - General characters & Outline classification upto Classes with examples.

Chiton, Murex, Sepia , Loligo,Octopus, Nautilus, Glochidium larva.

Echinodermata - General characters & Outline classification upto Classes with examples.

Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon,Asterias.Bipinnaria larva.

Hemichordata- Balanoglossus, Tornaria larva.

Demonstration of dissection / dissected / Virtual Dissections.

1. Leech / Prawn / Scorpion / Crab - Digestive system .
2. Prawn - Appendages,
3. Prawn / Scorpion / Crab - Nervous system,
4. Pila / Unio – Digestive system,
5. Mounting of statocyst
6. Mounting of Radula.

Compulsory one species to be adopted for demonstration only by the faculty.

Computer Aided Techniques as per U.G.C Guidelines.

Laboratory record work shall be submitted at the time of Practical Examination.

EXTERNAL PRACTICAL- I

Biology of Non – Chordates. w.e.f. 2017-2018.

(3 hrs/week)

MODEL QUESTION PAPER -I

Code: ZOO-101P

Credits: 2.

Time: 3 hrs.

Max.marks: 25m.

I. Draw neat labeled diagram of Digestive system of Leech. 6M.

II .Draw neat labeled diagram of Radula of Pila. 4M.

III. Spotters: Identify, draw labeled diagram & write notes on

A, B, C, D

4X3=12M

1. Viva. 3M

TOTAL:25M.

Guide lines for the practical Examiners

I.List of dissections:(8marks for diagram & 2 marks for labeling)

Leech/Prawn/Scorpion/Crab- Digestive system.

Prawn – Appendages.

Prawn / Scorpion /Crab- Nervous system

Pila / Unio – Digestive system.

II.Mounting of Statocyst / Mounting of Radula. (Mounting 4 marks, labeled diagram 1 marks)

III.Spotters:1Mark for identification, 1 Mark for labeled diagram & 3Marks for notes for each spotter.

Invertebrates: 4 specimens / slides / models.

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Biology of Non- Chordates

Internal Practical ICode: ZOO-101P.

MODEL QUESTION PAPER -II

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 05M.

2. Record -----10M.

3. Field note book. ----- 05M

4. Project (Within the syllabus) ----- 05M.

Total ----- 25M.

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ZOOLOGY
SEMESTER - II

w.e.f. - 2017 - 18

I B.Sc BZC

(Code : ZOO -201 C)

No. of Hours per week : 4

Max.Marks: 70

Credits : 3

Pass Mark : 28

Title of the Paper : Biology of Chordates

UNIT I 15hrs

1.1. Prochordata

1.1.1. Structure of Branchiostoma

1.1.2. Affinities of Cephalochordata

1.1.3. Structure and Life History of Herdmania

1.1.4. Significance of Retrogressive metamorphosis

UNIT II

15hrs

2.1. Cyclostomata

2.1. Differences between Petromyzon and Myxine

2.2. Pisces

2.2.1. Scoliodon - External features, Digestive System, Respiratory System, Heart, Brain

2.2.2. Migration in Fishes

2.2.3. Dipnoi

UNIT III

10hrs.

3.1. Amphibia

3.1.1. Rana hexadactyla - External features, Digestive System, Respiratory System, Heart, Brain

3.1.2. Parental care in Amphibians

3.2. Reptilia

3.2.1. Calotes - External features, Digestive System, Respiratory System, Heart, Brain

UNIT

IV

12hrs

4.1. Aves

4.1.1. Columbalivia - Exoskeleton, Digestive System, Respiratory System, Heart, Brain

4.1.2. Migration in Birds

4.1.3. Flight adaptations in Birds

UNIT V

8hrs

5.1. Mammalia

5.1.1. Differences between Prototheria & Metatheria.

5.1.2. Dentition in Mammals.

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Krishna Dt. A.P. (Autonomous)

Semester - I

Zoology – I

(Model question paper)

Code – Zoo-201C Title of the paper: Biology of Chordates.

Time: 3hrs.

Max. Marks: 70.

Section – A

5 x 4 = 20.

Answer any **five** questions. Each question carries **four** marks. Draw neat labeled diagrams wherever necessary.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Section – B

5 x 10 =50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

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Krishna Dt. A.P. (Autonomous)**

Semester – I

Zoology – I

Guide lines to the Paper Setter

Title of the paper: Biology of Chordates. Code – Zoo-201C

Time: 3hrs.

Max. Marks: 70.

Note:1. Answer any **five** questions out of eight in Section – A. Each question carries **four** marks.
5x4 = 20M.

2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks.
5x10= 50M.

	Section	UNIT-I prochordata	UNIT-II Cyclostomata & Pisces	UNIT-III Amphibia & Reptilia	UNIT-IV Aves	UNIT-V Mammalia
4 Marks Questions	A	1	2	2	2	1
10 Marks Questions	B	1	2	2	2	1
Weightage		14	28	28	28	14

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

PRACTICAL - II

w.e.f. 2017 - 2018

I B.Sc

Code : ZOO - 201P C

Hours / Week: 3

Max. Marks: 50

Credits: 2

External : 25

PAPER TITLE: BIOLOGY OF CHORDATES

Observation of the following slides / specimens / models:

Protochordata: Salient features of Urochordata & Cephalochordata.

Herdmania, Amphioxus, Amphioxus T.S. through pharynx.

Cyclostomata : General Characters of Cyclostomes.

Petromyzon, Myxine.

Pisces : General Characters & Classification upto Sub- Class level.

Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echeneis & Labeo

Types of Scales: Placoid scale, Cycloid scale, Ctenoid scale.

Amphibia : General Characters & Classification upto Order level.

Ichthyophis, Amblystoma, Siren, Hyla, Rachophorus, Axolotl larva.

Reptilia : General Characters & Classification upto Order level.

Draco, Chamaeleon, Uromastix, Russels viper, Naja, Bungarus, Enhydrina &

Testudo.

Aves : General Characters & Classification upto Sub- Class level.

Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo.

Mammalia : General Characters & Classification upto Sub- Class level.

Ornithorynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog.

Osteology : Appendicular skeletons of Varanus , Pigeon, Rabbit – Skull, Fore limbs, Hind limbs

Demonstration of dissection / dissected / virtual dissection:

1. V, VII, IX, X Cranial nerves of shark / locally available fishes.
2. Arterial system, venous system of Shark / Calotes / Fowl / Rat.
3. Digestive system of fish.

- **Laboratory record work shall be submitted at the time of practical examination**
- **Compulsory one species to be adopted for demonstration only by the faculty**

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
EXTERNAL PRACTICAL- II
w.e.f. 2017-2018.

BIOLOGY OF CHORDATES 3 hrs/week)

MODEL QUESTION PAPER -II

Code: ZOO-201P

Credits: 2.

Time: 3 hrs.

Max.marks: 25m.

- | | |
|---|---------|
| 3. Draw neat labeled diagram of IX & X Cranial nerves of Shark. | 7M |
| 4. Spotters: Identify , draw labeled diagram & write notes on
A, B, C, D & E | 5X3=15M |
| 5. Viva. | 3M |
| TOTAL: | 25M. |

Guide lines for the practical Examiners

List of dissections :(5marks for diagram & 2 marks for labeling)

1. V, VII, IX, X Cranial nerves of shark/ locally available fishes.
2. Arterial system, venous system of shark/ Calotes/Fowl/Rat.
3. Digestive system of fish.

Spotters: 1Mark for identification, 1 Mark for labeled diagram & 1 Mark for notes for each spotter.

Chordata: 4 Specimens / Slides / Models

(Prochordates, Fishes, Amphibians, Reptiles, Birds&Mammals)

Bone -1.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
INTERNAL PRACTICAL- II
BIOLOGY OF CHORDATES
w.e.f. 2017-2018.

(3 hrs/week).

Code: ZOO-201P.

MODEL QUESTION PAPER -II

Max.marks:25M.

Time: 3hrs.

- | | |
|-----------------------------------|------------|
| 1. Attendance | ----- 5M. |
| 2. Record | ----- 10M. |
| 3. Project (Earn while you learn) | -----10M. |

Total ----- 25M.

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(AUTONOMOUS)**

SEMESTER - IIIw.e.f. - 2017 - 18

Class: II B.Sc (B.Z.C)

Paper Code: ZOO -301C 60 Hrs (4hrs/ week)

Max.Marks: 100

Credits: 4

External :75

Title of the Paper : Cytology, Genetics and Evolution. Internal :25

Unit – I (Cytology-I)

1.1 Cytology - I

1.1.1 Electron microscopic structure of cell

1.1.2 Plasma membrane - Fluid mosaic model, Transport functions of plasma membrane (Active & Passive)

Unit – II (Cell Organelles)

2.1 Cell Organelles

2.1.1. Structure and functions of Endoplasmic reticulum.

2.2.2. Structure and functions of Golgi body.

2.3.3. Structure and functions of Ribosome's.

2.4.4. Structure and functions of Lysosomes.

2.5.5. Structure and functions of Mitochondria.

2.6.6. Chromosomes - Structure, types & functions

Unit – III (Genetics-I)

3.1 Genetics-I

3.1.1. Mendel's Laws of Inheritance.

3.1.2. Incomplete dominance and co-dominance

3.1.3. Lethal alleles, Epistasis

3.1.4. Linkage and crossing over

Unit – IV (Genetics-II)

4.1 Genetics - II

4.1.1. Sex determination (Male hetero & female homogametic, female hetero & male, homogametic type, Haplo – Diploid, Genic Balance Theory, Barr bodies.

4.1.2. Sex linked inheritance (X – linked, Y – linked & XY – linked inheritance. Sex – limited and Sex influenced inheritance.

4.1.3. Extra chromosomal inheritance (Kappa particles in Paramecium)

Unit – V (Evolution)

5.1. Evolution 5.1.1. Origin of life.

5.1.2. Hardy – Weinberg Equilibrium.

5.1.3. Lamarckism, Darwinism, Neo – Darwinism.

5.1.4. Isolation.

5.1.5. Speciation (Allopatric and Sympatric).

Reference Books:

1. Cell Biology, Genetics & Evolution ----- P.S Varama & V.K Agarwal

2. Cell & Molecular Biology..... Mohan P. Arora,

3. Cell Biology S.C.Rastogi,

4. Genetics ----- Dr. R. P. Meyyan & P.K. Gupta

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Krishna Dt. A.P. (Autonomous)
SEMESTER - III**

Time: 3hrs.

MODEL QUESTION PAPER

Section – A 5 x 5 = 25.

Answer any **five** questions. Each question carries **Five** marks. Draw neat labeled diagrams wherever necessary.

1. Cytoplasm. కణపదార్థము.
2. Fluid mosaic model. ద్రవమొజాయిక్ మూనా.
3. Golgi body. గాల్జీ దేహము.
4. Mitochondria. మైటోకాండ్రీయా.
5. Crossing Over. వినిమయము.
6. Linkage. సహలగ్నత
7. Barr bodies. బార్డేహములు.
8. Hardy- Weinberg law. హార్డివెయిన్బర్గ్ సత్రము.

Section – B

5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Describe the ultra structure of Eukaryotic cell?
యూకారియాటికూన్స్క్రకణనిర్మాణంనువివరింపుము.
10. Give an account of structure and functions of Endoplasmic reticulum.
అంతర్జీవద్రవ్యజాలకంయొక్కనిర్మాణముమరియువిధులనుగూర్చివ్రాయుము.
11. Describe the structure and functions of plasma membrane.
ప్లాస్మాత్వచముయొక్కనిర్మాణముమరియువిధులనుగూర్చివ్రాయుము.
12. Explain the structure and types of chromosomes?
క్రోమోజోములనిర్మాణముమరియురకములనుగూర్చివ్రాయుము.
13. Describe the Mendel's laws of Inheritance?
మెండల్ అనువంశికసూత్రములనుగూర్చివివరింపుము.
14. Write an essay on Epistasis.
ఎపిస్టాటిస్మార్చివ్యాసంవ్రాయుము.
15. Explain sex determination with the help of Balance theory.
లింగసంతులనుసిద్ధాంతంద్వారాలింగనిర్ధారణనువివరింపుము.
16. Write an essay on Isolation?
వివక్షతగూర్చివ్యాసంవ్రాయుము.

**A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - III

Guide lines to the Paper Setter

Title of the paper:

Cytology, Genetic & Evolution Code – Zoo-301C

Time: 3hrs.

1. Answer any **five** questions out of eight in Section .A. Each question carries five marks. 5x5=25m.

2. Answer any **five** questions out of eight in Section – B.Each question carries **Ten** marks 5x10= 50M.

	PART	UNIT-I Cytology I	UNIT-II Cell Organelles	UNIT-III Genetics-I	UNIT-IV Genetics-II	UNIT-V Evolution
5 Marks Questions	A	1	2	1	2	2
10 Marks Questions	B	1	2	1	2	2
Weightage		15	30	15	30	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

**A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)
ZOOLOGY PRACTICAL SYLLABUS
PAPER – III**

**Periods: 24 Max.Marks:50 Paper Title: Cytology, Genetics & Evolution.
Code: ZOO 301P**

I. Cytology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chironomous*

II. Genetics

1. Study of Mendelian inheritance using suitable examples
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin's finches (pictures)
5. Visit to natural history museum and submission of report

.....
**MODEL QUESTION PAPER
EXTERNAL PRACTICAL –III
Cytology, Genetics & Evolution Code: ZOO-301P.**

I. Cytology Max.marks:25M

1. Identify, draw neat labeled diagram & notes of the following stages. 2x2 ½= 5M.

A & B

II. Genetics

1. Genetics Problem. 5M.
2. Identify the following Chromosomes & Comment. 2x2 ½= 5M.

A & B

III. Evolution

1. Identify the given pictures and write the Comment. 2x2 ½= 5M

A & B

2. Identify the given pictures and Comment. 2x2 ½= 5M

A & B

Total=25M

INTERNAL PRACTICAL

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 5M.
 2. Record ----- 10M.
 3. Field trip & Field note book -----10M.
- otal----- 25M.

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU- 521165, KRISHNS Dt., A.P.
(AUTONOMOUS)**

SEMESTER - IV w.e.f. - 2017 - 18

Class : II B.Sc (B.Z.C) Paper Code : ZOO -401C

Credits : 4

Max.Marks: 100

60 hrs. (4hrs / week)

External : 75

Internal : 25

Title of the Paper: Embryology, Physiology and Ecology.

**Unit – I
(Embryology)**

1.1 Developmental Biology and Embryology

1.1.1 Gametogenesis (Spermatogenesis, Oogenesis)

1.1.2 Fertilization

1.1.3 Types of eggs

1.1.4 Types of cleavages

1.2 Development of Frog upto formation of Primary germ layers.

1.3 Foetal membranes in Chick

1.4 Development - types and functions of Placenta in mammals

**Unit – II
(Physiology - I)**

2.1 Physiology - I

2.1.1 Elementary study of digestive process

2.1.2 Absorption of digested food

2.1.3 **Respiration** – Structure of mammalian Lung & Mechanism of respiration , transport of oxygen and carbon dioxide

2.1.4 **Circulation** - Structure and functioning of heart, Cardiac cycle

2.1.5 **Excretion** - Structure of nephron, urine formation, counter current mechanism

**Unit – III
(Physiology - II)**

3.1 Physiology - II

3.1.1 Structure & functional properties of Nerve Cell, Production & propagation of nerve impulse
Resting potential & Action Potential, Synaptic transmission.

3.1.2 Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle contraction.

3.1.3 Endocrine glands - Structure, secretions and the functions (of hormones) of pituitary, thyroid, parathyroid, adrenal glands and pancreas.

3.1.4 Hormonal control of reproduction in Mammals.

**Unit – IV
(Ecology – I)**

4.1 Ecology - I

4.1.1 Abiotic factors of Ecosystem – Temperature & Light.

4.1.2 Nutrient cycles - Nitrogen, Carbon and Phosphorus.

4.1.3 Components of Ecosystem (Example: lake), food chains and food web, energy flow in ecosystem.

Unit – V
(Ecology - II, Zoogeography)

5.1 Ecology - II

5.1.1 Habitat and ecological niche.

5.1.2 Community interactions - Mutualism, commensalism, parasitism.

5.1.3 Ecological succession.

5.2 Zoogeography

5.2.1 Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions.

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(Autonomous)

SEMESTER- IV
(Model Question paper)

Time :3 hrs

Max.Marks:75

Part – A

Answer **any five** questions out of eight in Section-A . Each question carries five marks. **5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Section-B . Each question carries Ten marks.**5x10=50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

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(Autonomous)
SEMESTER-IV

Time :3 hrs

Max.Marks:75

Guide lines to the paper setter

Note :1. Answer **any five** questions out of eight in Section-A . Each question carries five marks.
5 X 5 = 25M.

2. Answer **any five** questions in Section-B . Each question carries 10 marks. 5 X 10 = 50M.

	Section	Unit – I Embryology	Unit – II Physiology - I	Unit – III Physiology - II	Unit – IV Ecology-I	Unit – V Ecology - II, Zoogeography
5 Marks Questions	A	2	1	2	1	2
10Marks Questions	B	2	2	1	1	2
Weightage		30	25	25	15	30

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

ZOOLOGY PRACTICAL SYLLABUS - SEMESTER - IV

ZOOLOGY - PAPER – IV w.e.f: 2017-18

Max. Marks : 50

Paper Code: 401P

Periods: 24

Title: Embryology, Physiology and Ecology

I. Embryology

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Study of chick embryo of 18 hours, 24 hours, 33 hours and 48 hours of incubation

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Study of activity of salivary amylase under optimum conditions
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage

III. Ecology

1. Determination of pH of given sample
2. Estimation of dissolved oxygen of given sample
3. Estimation of total alkalinity of given sample
4. Estimation of salinity of given sample

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU

ZOOLOGY PRACTICAL -IV

Embryology,Physiology & Ecology

Model question paper (External)

Paper Code: ZOO-401C

Max.Marks: 25 M.

I.Embryology:

1. Identify, draw neat labeled diagram & comment on . $1\frac{1}{2} \times 2 = 3M.$ **A & B**

II. Physiology

2. Identify, draw neat labeled diagram & comment on . $1\frac{1}{2} \times 2 = 3M.$
A & B

3. Identify the organic substances in the given samples A & B, each with two tests.
 $4 \times 1\frac{1}{2} = 6M.$ (Sample A- $2 \times 2\frac{1}{2} = 5$ Marks & sample B -- $2 \times 2\frac{1}{2} = 5$ Marks)

4. Identify the Excretory products in the given samples A & B, each with two tests. $4 \times 1\frac{1}{2} = 6M.$
(Sample A- $2 \times 2\frac{1}{2} = 5$ Marks & sample B -- $2 \times 2\frac{1}{2} = 5$ Marks)

III. Ecology:

5. Determine the pH of given sample. $1 \times 2 = 2M.$

6. Estimate the dissolved oxygen in the given sample. $1 \times 5 = 5M.$

ZOOLOGY PRACTICAL -IV INTERNAL

Embryology,Physiology & Ecology Code: ZOO-401P.

Max.marks:25M

Time: 3hrs.

1. Attendance ----- 5M.
2. Record ----- 10M.
3. Assignment ----- 10M.

Total ----- 25M.

ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYURU- 521165, KRISHNA Dt., A.P. (AUTONOMOUS)

SEMESTER - V (CBCS)

(Zoology paper-V)

Class: III B.Sc (B.Z.C)

w.e.f.- 2017-18

60 Hrs.(6hrs/week)

paper code:Zoo-501C

Credits :3

External :75

BiotechnologyInternal:25

Unit 1:Tools of Recombinant DNA technology - Enzymes and Vectors **15 Hrs.**

1.1 Restriction modification systems : : Types I, II and III- Nomenclature, Mode of action.

1.1.2: Applications of Type II restriction enzymes in genetic engineering

1.2 DNA modifying enzymes and their applications:

1.2.1: DNA polymerases, Terminal deoxynucleotidyl transferase, kinases and phosphatases,and DNA ligases

1.3 Cloning Vectors:

1.3.1 :Properties of Cloning Vectors

1.3.2: Plasmid vectors:pBR and pUC 18, Bacteriophage lambda and M13 based vectors, Cosmids.

1.3.3: Artificial Chromosome Vectors: BACs, YACs,

Unit 2: Techniques of Recombinant DNA technology **15 Hrs.**

2.1 Cloning:

2.1.1: Procedure of gene cloning

2.1.2: Use of linkers and adaptors

2.2 Gene delivery:

2.2.1 :Microinjection, electroporation, biolistic method (gene gun),Calcium method.

2.3 PCR:

2.3.1: Basics of PCR: Definition, Principle and Procedure of PCR.

2.4 DNA Sequencing:

2.4.1: Sanger's method of DNA sequencing- traditional and automated sequencing

2.4.2:DNA finger printing.

2.5 Hybridization techniques:

2.5.1: Southern, Northern and Western blotting.

2.6 Genomic and cDNA libraries:

2.6.1: Preparation and uses

UNIT 3 Animal Cell Technology **10 Hrs.**

3.1 Cell culture media:

3.1.1: Natural and Synthetic

3.2 Types Cell cultures:

3.2.1: primary culture, secondary culture,

3.2.2: Protocols for Primary Cell Culture

3.2.3: Continuous cell lines , Established Cell lines (common examples such as MRC, HeLa,CHO, BHK, Vero)

3.2.4: Cryopreservation of cultures.

3.3 Hybridoma Technology:

3.3.1: Cell fusion, Production of Monoclonal antibodies (mAb)

3.3.2: Applications of mAb

3.4 Stem cells:

3.4.1:Types of stem cells- Embryonic and Adult Stem Cells

3.4.2: Applications of Stem Cell Technology in Cell based therapy- Diabetes and Parkinson's diseases.

Unit 4: Reproductive Technologies & Transgenic Animals **10 Hrs.**

4.1 Manipulation of reproduction in animals:

4.1.1: Artificial Insemination, *In vitro* fertilization .

4.1.2: super ovulation, Embryo transfer, Embryo cloning

4.2 Transgenic Animals:

4.2.1:Production of Transgenic Animals- sheep,fish

Unit 5: Applied Biotechnology **10 Hrs.**

5.1 Industry:

5.1.1:Fermentation: Different types of Fermentation.

5.1.2: Submerged & Solid state, batch, Fed batch & Continuous (Short notes only)

5.1.3: Downstream processing - Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

5.2 Fisheries : 5.2.1: Polyploidy in fishes

Reference Books :

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing , Oxford,U.K
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. ElsevierAcademic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
4. Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. ColdSpring Harbor Laboratory Press
5. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
6. Brown TA. (2007). Genomes-3. Garland Science Publishers
7. Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.

A.G& S.G.S.DEGREECOLLEGE OF ARTS & SCIENCE,VUYYURU (AUTONOMOUS)

SEMESTER-V (Model Question paper)

Paper Title :Animal BiotechnologyPaper Code : 501C

Answer **any five** questions out of eight in Part - A . Each question carries five marks.**5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

SEMESTER-V

Time :3hrs

Max.Marks:75

Guide lines to the paper setter

Paper Title : Animal Biotechnology

Paper Code : 501C

Note :1. Answer **any five** questions out of eight in Part-A . Each question carries five marks.5 X 5 = 25M.

2. Answer **any five** questions in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	25	20

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

ZOOLOGY PRACTICAL SYLLABUS

PAPER - V

Periods : 30 Max.Marks:50

Credits :2

Title : Animal Biotechnology

Code: ZOO-501P Paper

-
1. Genomic DNA isolation from *E. coli*
 2. Plasmid DNA isolation (pUC 18/19) from *E. coli*
 3. Study the following techniques through photographs
 - a. Southern blotting
 - b. Western blotting
 - c. DNA sequencing (Sanger's method)
 - d. DNA finger printing
 4. PCR (demonstration) on site or of site demonstration
 5. Project report on animal cell culture

Guide lines for the Practical Examiners.

1. Identify the following Genomic DNA isolation from *E. coli*.
(5 marks for Procedure)
2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* .
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. PCR (demonstration) on site or of site demonstration.
(5 marks for PCR demonstration)

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KRISHNA Dt., A.P. (AUTONOMOUS)**

Practical - V

w.e.f. 2017 - 18

(Animal Biotechnology)

Max. Marks : 25

Model Question Paper (External)

Paper Code : ZOO-501P

1. Identify the following Genomic DNA isolation from *E. coli*. 5m
 2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* . 5m
 3. Study the following techniques given on photographs & Write notes on. 2x5=10m
A & B
 4. PCR (demonstration) on site or of site demonstration. 5m
- Total: 25m

**A.G& S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE,VUYYURU - 521165,
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Practical - V

w.e.f. 2017 - 18

(Animal Biotechnology)

Max. Marks : 25

Model Question Paper (Internal)

Paper Code : ZOO-501P

1. Attendance -- 5 M
 2. Record -- 10M
 3. Field trip & Field note book -- 10M
- Total -- 25M

SEMESTER - V (CBCS)

(Zoology paper-VI)

Class: IIIB.Sc (B.Z.C)

w.e.f.-2017-18

60 Hrs(6hrs/ week)

paper code:Zoo-502C

Credits :3

External : 75 Title of the Paper : Animal Husbandry.

Internal:25

UNIT – I :

10 Hours

- 1.1 General introduction to poultry farming.
- 1.2 Principles of poultry housing. Poultry houses.
- 1.3 Systems of poultry farming.
- 1.4 Management of chicks, growers, layers, and Broilers.

UNIT – II:

10 Hours

- 2.1 Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers.
- 2.2 Methods of feeding- Whole grain feeding system, Grain and mash method, All mash method, Pellet feeding.
- 2.3 Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III:

10 Hours

- 3.1 Selection, care and handling of hatching eggs.
- 3.2 Egg testing.
- 3.3 Methods of hatching.
- 3.4 Brooding and rearing.
- 3.5 Sexing of chicks.

UNIT- IV:

20 Hours

- 4.1 Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds.
- 4.2 Systems of inbreeding and crossbreeding.
- 4.3 Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn

UNIT - V:

10 Hours

- 5.1 Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.
- 5.2 Cleaning and sanitation of programme. Records to be maintained in a dairy farm.

SEMESTER-V (Model Question paper)

Paper Title : Animal Husbandry

Paper Code : Zoo-502C

Answer **any five** questions out of eight in Part - A . Each question carries five marks. **5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

SEMESTER - VI

ZOOLOGY –ELECTIVE PAPER: VII-(A)

Class: III B.Sc (B.Z.C)
60 Hrs.
Credits :3
Immunology

w.e.f.- 2017- 18
Paper code: Zoo- 601-A(EI)
Internal:25

Unit – I

1.1 Overview of Immune system

- 1.1.1 Introduction to basic concepts in Immunology
- 1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system

- 1.2.1 Cells of immune system
- 1.2.2 Organs of immune system

Unit – II

2.1 Antigens

- 2.1.1 Basic properties of antigens
- 2.1.2 B and T cell epitopes, haptens and adjuvants
- 2.1.3 Factors influencing immunogenicity

Unit – III

3.1 Antibodies

- 3.1.1 Structure of antibody
- 3.1.2 Classes and functions of antibodies
- 3.1.3 Monoclonal antibodies

Unit – IV

4.1 Working of Immune system

- 4.1.1 Structure and functions of major histocompatibility complexes
- 4.1.2 Exogenous and Endogenous pathways of antigen presentation and processing
- 4.1.3 Basic properties and functions of cytokines

Unit – V

5.1 Immune system in health and disease

- 5.1.1 Classification and brief description of various types of hyper sensitivities
- 5.1.2 Introduction to concepts of autoimmunity and immunodeficiency

5.2 Vaccines

- 5.2.1 General introduction to vaccines
- 5.2.2 Types of vaccines

□

SEMESTER-VI (Model Question paper)

Paper Code : Zoo-601-A(EI)

Paper Title :Immunology

Part - A

Answer **any five** questions out of eight in Part - A . Each question carries five marks.**5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

ZOOLOGY PRACTICAL SYLLABUS

Period : 30

Credits :2

Paper Title: Immunology

PAPER – VI

Max.Marks:50

Paper Code : Zoo-601-A (EI)P

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C)

(Cluster Elective Paper: VIII-B-1)

w.e.f. - 2017 - 18

60 Hrs.(6hrs/week)

Paper Code : ZOO-602B-1(CI)

Credits : 3

External : 75

Title of the Paper: **Principles of Aquaculture.**

Internal:25

UNIT -I

1.1 Introduction / Basics of Aquaculture

15hrs

1.1.1 Definition, Significance and History of Aquaculture

1.1.2 Present status of Aquaculture – Global and National scenario

1.1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.

1.1.4 Criteria for the selection of species for culture

Unit – II

2.1 Types of Aquaculture

15hrs

2.1.1 Freshwater, Brackishwater and Marine

2.1.2 Concept of Monoculture, Polyculture, Composite culture, Monosex culture and Integrated fish farming

2.2 Culture systems

2.2.1 Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems

2.3 Culture practices

2.3.1 Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.

Unit – III

3.1 Design and construction of aquafarms

15hrs

3.1.1 Criteria for the selection of site for freshwater and brackish water pond farms

3.1.2 Design and construction of fish and shrimp farms

3.2 Seed resources

3.2.1 Natural seed resources and Procurement of seed for stocking: Carp and shrimp

3.3 Nutrition and feeds

3.3.1 Nutritional requirements of a cultivable fish and shellfish

3.3.2 Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

4.1 Management of carp culture ponds

10hrs

4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting of ponds

4.2 Culture of giant freshwater prawn, *Macrobrachium rosenbergii*

Unit – V

5.1 Types of cultures

10hrs

5.1.1 Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*)

5.1.2 Culture of pearl oysters

5.1.3 Culture of seaweeds-species cultured, culture techniques, important by-products, prospects

5.1.4 Culture of ornamental fishes – Setting up and maintenance of aquarium; and breeding.

REFERENCES BOOKS

1. Bardach, JE *et al.* 1972. *Aquaculture – The farming and husbandry of freshwater and marine organisms*, John Wiley & Sons, New York.
2. Bose AN *et al.* 1991. *Coastal aquaculture Engineering*. Oxford & IBH Publ.Co.Pvt.Ltd.
3. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn*. Daya Publ. House.
4. FAO. 2007. *Manual on Freshwater Prawn Farming*.
5. Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
6. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
7. Ivar LO. 2007. *Aquaculture Engineering*. Daya Publ. House.
8. Jhingran V.G. 2007. *Fish and Fisheries of India*. Hindustan Publ. Corporation, India.
9. Landau M. 1992. *Introduction to Aquaculture*. John Wiley & Sons.

SEMESTER-VI Cluster Electives paper –VIII-B-1

Guide lines to

the paper setter Time :3 hrs
Max.Marks:75

Paper Title :

Principles of Aquaculture

Paper Code : Zoo-602B-1(EI)

Note : 1. Answer **any five** questions out of eight in Part-A . Each question carries five marks.

5 X 5 = 25M.

2. Answer **any five** questions in Part-B . Each question carries 10 marks.

5 X 10 = 40M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

Note: 1. Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media

SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-1

Time : 3 hrs

Max.Marks:75

Paper Title :Principles of Aquaculture

Paper Code : Zoo-602B-1(EI)

Part - A

Answer **any five** questions out of eight in Part - A . Each question carries five marks.**5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

**A.G& S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE,VUYYURU - 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)**

Practical - VI **w.e.f. 2017 -**
18Principles of AquacultureMax. Marks : 25 **Model Question Paper (External)**
Paper Code : ZOO-601B (El)P

I. Cultivable fishes:

1. Spotters: Identify , draw neat labeled diagram and comment on 4X2=8M
A,B,C & D

II.Diseases:

- 2.. Identification and study of fish and shrimp diseases - Using specimens / pictures 2X2=4M
A &B
3External examination of the diseased fish – diagnostic features and procedure. 3M
4. Determination of dosages of chemicals and drugs for treating common diseases. 1x3=3M

III.Pond Management:

- 5.Identification and study of common zooplankton, aquatic insects and aquatic weeds .2X2=4M
A & B
6. Salinity in the pond water sample. 3M

**A.G& S. G.S.Degree College of Arts &Science,Vuyyuru - 521165, Krishna Dt., A.P.
(Autonomous)**

Practical - VI **w.e.f. 2017 - 18**
Principles of AquacultureMax. Marks : 25 **Model Question Paper (Internal)**
Paper Code : ZOO-601B (El)P

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
	Total --	25M

ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYURU- 521165, KRISHNA Dt., A.P. (AUTONOMOUS)

SEMESTER - VI (CBCS) w.e.f. - 2017 - 18

Class: III B.Sc (B.Z.C) (Cluster Elective Paper: VIII-B-2)
Paper Code : ZOO-603B-2(EI) Credits : 3

60 Hrs.(6hrs/week)
External : 75

Internal:25

Title of the Paper: **Aquaculture Management.**

Unit – I

1.1 Breeding and Hatchery Management 10hrs

- 1.1.1 Bundh Breeding and Induced breeding of carp by Hypophysation; and use of synthetic hormones.
- 1.1.2 Types of fish hatcheries; Hatchery management of Indian major carps
- 1.1.3 Breeding and Hatchery management of *Penaeus monodon*/ *Litopenaeus vannamei*
- 1.1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management 10hrs

- 2.1.1 Water quality and soil characteristics suitable for fish and shrimp culture
- 2.1.2 Identification of oxygen depletion problems and control mechanisms in culture ponds
- 2.1.3 Aeration: Principles of aeration and Emergency aeration
- 2.1.4 Liming materials, Organic manures and Inorganic fertilizers commonly used and their implications in fish Ponds.

Unit – III

3.1 Feed Management 15hrs

- 3.1.1 Live Foods and their role in shrimp larval nutrition.
- 3.1.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics.
- 3.1.3 Feed formulation and manufacturing; Feed storage
- 3.1.4 Feeding strategies: Feeding devices, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

Unit – IV

4.1 Disease Management 15hrs

- 4.1.1 Principles of disease diagnosis and health management;
- 4.1.2 Prophylaxis, Hygiene and Therapy of fish diseases
- 4.1.3 Specific and non-specific defense systems in fish; Fish immunization and vaccination
- 4.1.4 Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds
- 4.1.5 Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases in shrimp ponds

Unit – V

5.1 Economics and Marketing 15hrs

- 5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis
- 5.1.2 Fish marketing methods in India; Basic concepts in demand and price analysis

5.2 Fisheries Extension

- 5.1.3 Fisheries Training and Education in India; Role of extension in community development.

5.3 Fish Genetics

- 5.1.4 Genetic improvement of fish stocks – Hybridization of fish.
- 5.1.5 Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes, Production of monosex and sterile fishes and their significance in aquaculture.

REFERENCE BOOKS

1. Boyd CE. 1979. *Water Quality in Warm Water Fish Ponds*. Auburn University
2. Boyd, CE. 1982. *Water Quality Management for Pond Fish Culture*. Elsevier Sci. Publ. Co.
3. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn*. Daya Publ. House
4. Conroy CA and Herman RL. 1968. *Text book of Fish Diseases*. TFH (Great Britain) Ltd, England.
5. Halver J & Hardy RW. 2002. *Fish Nutrition*. Academic Press.
6. Ian C. 1984. *Marketing in Fisheries and Aquaculture*. Fishing News Books.

A.G& S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)

SEMESTER-VI Cluster Electives paper –VIII-B-2

Guide lines to the paper setter Time :3 hrs

Max.Marks:75

Paper Title

:Aquaculture Management

Paper Code : Zoo-603B-2(EI)

Note :1. Answer **any five** questions out of eight in Part-A . Each question carries five marks.

5 X 5 = 25M.

2. Answer **any five** questions in Part-B . Each question carries 10 marks.

5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

Note: 1. Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

A.G& S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.

(AUTONOMOUS)

SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-2

Time : 3 hrs

Max.Marks:75

Paper Title :Aquaculture Management.

Paper Code : Zoo-603B-2(EI)

Part - A

Answer **any five** questions out of eight in Part - A . Each question carries five marks.**5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

ZOOLOGY PRACTICAL – II

Credits: 2 PAPER – VIII-B Periods : 30 Max.Marks:50

Paper Title :

Aquaculture Management

Code : ZOO-603B-2(EI)P

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates, lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
4. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

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Practical - VI **w.e.f. 2017-18**
AquacultureManagement **Max. Marks : 25 Model Question Paper (**
External) **Paper Code : ZOO-601B-2 (El)P**

I. Nutrition:

1. Identification and study of Live food organisms -A&B . 2X2=4M
2. Estimation of Proximate composition of aquaculture feeds -A&B . 2X2^{1/2}=5M

II. Post harvest Technology:

3. Cured and fermented fish Products (Procedure) 5M
4. Preparation of isinglass ,collagen and chitosan from shrimp and crab shell. 5M
5. Identification of hazards & Comment on A & B 2x3=6M

Total----- 25M

Practical - VI **w.e.f. 2017 - 18**
AquacultureManagement **Max. Marks : 25** **Model Question Paper (**
Internal) **Paper Code : ZOO-601B-2 (El)P**

1. Attendance -- 5 M
2. Record -- 10M
3. Assignments -- 10M

Total -- 25M

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C) (Cluster Elective Paper: VIII-B-3) w.e.f. - 2017 - 1860 Hrs
Paper Code : ZOO-604B-3(EI)
Credits : 3 External : 75
Title of the Paper: **Postharvest Technology.** Internal:25

Unit – I

1.1 Handling and Principles of fish Preservation

- 1.1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigormortis and spoilage), spoilage in marine fish and freshwater fish.
1.1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to lowradiation of gamma rays.

Unit – II

2.1 Methods of fish Preservation

- 2.1.1 Traditional methods - sun drying, salt curing, pickling and smoking.
2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

3.1 Processing and preservation of fish and fish by-products

- 3.1.1 Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.
3.1.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.2 Seaweed Products

- 3.2.1 Preparation of agar, algin and carrageen. Use of seaweeds as food for human consumption, in disease treatment and preparation of therapeutic drugs.

Unit – IV

4.1 Sanitation and Quality control

- 4.2.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.
4.2.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

4.2 Regulatory affairs in industries

Unit – V

5.1 Quality Assurance, Management and Certification

- 5.1.1 Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.
5.1.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, Codex Alimentarius.

REFERENCE BOOKS

1. Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.
2. Bond, et al. 1971. *Fish Inspection and Quality Control*. Fishing News Books, England
3. Clucas IJ. 1981. *Fish Handling, Preservation and Processing in the Tropics*. Parts I, II. FAO
4. Gopakumar K. (Ed.). 2002. *Text Book of Fish Processing Technology*. ICAR.
5. Govindan, TK.1985. *Fish Processing Technology*, Oxford-IBH.
6. Hall GM. (Ed). 1992. *Fish Processing Technology*. Blackie.
7. Huss HH, Jakobsen M & Liston J. 1991. *Quality Assurance in the Fish Industry*. Elsevier.

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(AUTONOMOUS)
SEMESTER-VI
Cluster Electives paper –VIII-B-3**

Guide lines to the paper setter Time :3 hrs

Max.Marks:75

:Postharvest Technology.

Paper Title

Paper Code : Zoo-604B-3(EI)

Note : 1. Answer **any five** questions out of eight in Part-A . Each question carries five marks.

5 X 5 = 25M.

2. Answer **any five** questions in Part-B . Each question carries 10 marks.

5 X 10 = 50M.

	PAR T	Unit –I	Unit – II	UnitIII	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

**A.G& S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

**SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-3**

Time : 3 hrs

Max.Marks:75

Paper Title :Postharvest Technology.

Paper Code :Zoo-604B-2 (EI)

Part - A

Answer **any five** questions out of eight in Part - A . Each question carries five marks.**5 X 5 = 25**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)

ZOOLOGY PRACTICAL – III

Credits:2 PAPER – VIII-B Periods : 30 Max.Marks:50

Paper Title : Postharvest

Technology

Code : ZOO -604B-3(EI)P

Project Work

Visit to a fish breeding centre / fish farms and submit a project report

or

Visit to a feed manufacturing unit and submit a project report

or

Visit to a shrimp hatchery / shrimp farms and submit a project report

or

Visit to a shrimp processing unit and submit a project report

A.G&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

VUYYURU, KRISHNA Dt, A.P.

Accredited by NAAC with "A" Grade



DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES 16-10-2019

ODD SEMESTER


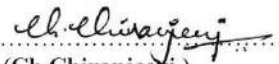
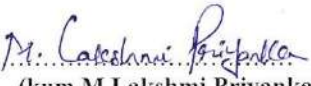
2019-20



Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 AM on 16-04-2019 in the Department of Zoology.

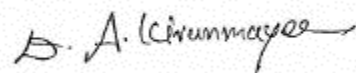
Smt.D.A. Kiranmayee. ... Presiding

Members Present:

- 1)  Chair person Head, Department of Zoology, A.G&S.G.S Degree College of Vuyyuru-521165.
(Smt. D.A.Kiranmayee.)
- 2)  University Nominee Dr. J.N.Lavanya Latha, Krishna University, Machilipatnam.
(Dr.J.N.Lavanya Latha.)
- 3)  Academic Council Nominee Head, Department of Zoology, JKC College, Guntur.
(Dr. K.Daniel.)
- 4)  Academic Council Nominee Head, Department of Zoology, Gov. Degree College, Pitapuram.
(B.Elia.)
- 5)  Industrialist Asst. Project Manager, RGCA Manikonda.
(B. Appala Naidu.)
- 6)  Student Represent P.hD –Research Scholar, Dept.of Botany & Microbiology, Acharya Nagarjuna University, Guntur.
(Ch.Chiranjeevi.)
- 7)  Member Lecturer in Zoology, A.G&S.G.S Degree College Vuyyuru-521165.
(kum.M.Lakshmi Priyanka.)

AGENDA for BOS Meeting

- 1.To review and recommend the syllabi (theory and Practical), Model question paper and guidelines for Semester I of B. Sc. (BZC) under the CBCS system
2. To recommend the additions made for the III Semester ZOO-301C of II B. Sc. (BZC) syllabus and model paper in the academic year 2019-20.
- 3.To discuss the syllabus of V Semester Zoo- 501 and Zoo-502 and make necessary additions and deletions in the syllabus and model paper in the academic year 2019-20.
- 4.To recommend the teaching and evaluation methods to be followed under Autonomous status.
5. Any other matter.



Chairman

Resolution

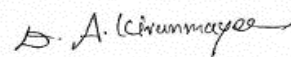
1. It is resolved to continue the same syllabi (Theory and Practical), Model Question paper of SEM I of I B. Sc. (BZC) under the CBCS system

2. It is resolved to add DNA - Watson & Crick Model, Semi conservative replication and Structure, Types and Functions of RNA in Unit II, and Blood Group Inheritance in Unit IV of III Semester of II B. Sc. (BZC) under the CBCS system.

3. It is resolved to delete Genomics and c-DNA Libraries, preparation and uses from unit II of V Semester of Animal Biotechnology, Zoo- 501 of III B. Sc. (BZC) under the CBCS system.

4. It is resolved to continue the same syllabus for V Semester of Animal Husbandry Zoo- 502 of III B. Sc. (BZC) under the CBCS system.

4. It is resolved to continue the previous year teaching and evaluation methods for the academic year 2019-20 also.



Chairman

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt.,A.P. (AUTONOMOUS).

ZOOLOGY

Class: I B.Sc .

PAPER-I

w.e.f. 2017-2018

Credits : 3

Code: Zoo-101C)

Title of the paper: **Biology of Non – Chordates.**

Max.Marks : 70

60 hrs.(4hrs/week)

Objective of the course: To introduce the basic principles Biology of Non –Chordates, different types of based on specific characters and the phyla.

Course outcomes:

- ❖ Students can easily understand the phylogeny of life, connecting link between different phyla and the diversity of fauna.
- ❖ They learn the general characters of each phylum and their classification and identify animals using different taxonomical keys.
- ❖ Students get the essentials of each body part and their functioning.
- ❖ The students will have knowledge on useful and harmful animals
- ❖ They learn more about the structure and characters of Larval forms

UNIT - I

10hrs.

1.1: Significance of Diversity of Invertebrates.

1.2: **Phylum - Protozoa:** Type study: Elphidium

1.3: **Phylum - Porifera :**Type study: Sycon - Morphology, histology, spicules

1.4: Canal system in Sponges.

UNIT-II

16hrs.

2.1 **Phylum - Coelenterata :**Type study : Obelia - Morphology, Structure of Polyp & Medusa.

2.2: Polymorphism in Coelenterates.

2.3: Coral& Coral reef formation.

2.4. **Phylum- Platyhelminthes:** Type study: Fasciola hepatica – Morphology, Excretory system, Reproductive

system,Life history &Pathogenecity

.2.5**Phylum - Nematelminthes:**Type study: Ancylostoma duodenale - Morphology & Life history

UNIT-III 10hrs.

3.1 **Phylum - Annelida:**Type study:Hirudinaria granulose – Morphology, Digestive system, excretory system & Reproductive system.

3.2: Coelomoducts.

3.3:Vermiculture: Scope, Significance of Vermiculture, Earthworms Sps, Processing of Vermiculture, Vermicompost, and Economic Importance of Vermicompost.

UNIT-IV15hrs.

4.1**Phylum - Arthropoda :** Type study: Prawn – External characters [Except appendages], Respiratory system &Circulatorysystem.

4..2Peripatus : Structure & affinities.

4.3**Phylum – Mollusca:** Pearl Formation in Pelecypoda.

4.4. Torsion in Gastropoda.

UNIT- V9hrs.

5.1: **Phylum - Echinodermata :**

5.1.1 Water vascular system of Star Fish.

5.2 **Hemichordata :**Balanoglossus: Structure , Affinities.

5.3.**Invertebrates Larval forms :**Amphiblastula, Ephyra, Trochophore, Nauplius,

Glochidium, Bipinnaria, Tornaria.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester – I

w.e.f. 2017-2018

Title of the paper: Biology of Non – Chordates. Code – Zoo-101C

Time: 3hrs.

max.marks: 70

Section – A

4 x 5= 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

- 1.Spicules in Sycon. సైకాన్ లో కంటకముల రకములు
2. Structure of medusa in obelia. ఒబీలియాలో మెడ్యూసా నిర్మాణము
3. Life history of Ancylostoma duodenale. ఎంఘైలోస్టోమ డియోడినేల్ జీవిత చరిత్ర
4. Coelomoducts in Annelida. అనెలిడాలో శరీర కుహర నాళికలు
5. Significance of Vermiculture . వర్మికల్చర్ ప్రాముఖ్యత
6. Affinities of Peripatus . పెరిపాటస్ సంబంధ బాంధవ్యములు
7. Structure of Balanoglossus . బెలనోగ్లోసస్ నిర్మాణము
8. Bipinnaria Larva. బైపిన్నేరియా డింభకము

Section – B

5 x 10 =50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

- 9.Elphidium shows alternation of generations in its life cycle – discuss.
ఎల్ఫీడియం తన జీవిత చరిత్రలో ఏకాంతర తరాలను చూపించును- వివరింపుము.
- 10.Write an account of canal system in Porifera.
పోరిఫెరా జీవులలో కుల్యా వ్యవస్థను విశదీకరించండి.
- 11.Describe briefly the phenomenon of polymorphism in Coelenterates.
సీలెంటరేటా వర్గములో బహురూపకతను వివరించండి.
12. Describe the life history of Fasciola hepatica.
ఫాసియోలా హిపాటికా జీవిత చరిత్రను గురించి వివరింపుము.
- 13.Describe the excretory system in leech.
జలగలో విసర్జక వ్యవస్థను వివరింపుము.
- 14.Explain the respiratory system in prawn.
రొయ్యలో శ్వాస వ్యవస్థను వివరించుము.
15. Explain the process of peral formation in pelecypoda.
పెలిసిపోడ జీవులలో ముత్యము ఏర్పడు విధానమును వివరింపుము.
- 16.Describe the Wter vascular system in Starfish.
సముద్ర నక్షత్రములో జలప్రసరణ వ్యవస్థను వివరించండి.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - I

Guide lines to the Paper Setter.

W.e.f. 2017-2018

Title of the paper: Biology of Non – Chordates. Code – Zoo-101C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A. Each question carries **five** marks. 4x5 = 20M
2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10= 50M.

	Section	UNIT-I (Protozoa - Porifera)	UNIT-II (Coelenterata- Nemathelminthes)	UNIT-III (Annelida)	UNIT-IV (Arthropoda – Mollusca)	UNIT-V (Echinodermata – Hemichordata)
5 Marks Questions	A	1	2	2	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		25	30	20	15	20

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

ZOOLOGY
PRACTICAL - I

w.e.f. 2017-2018
MAX.MARKS : 50.

Code :Zoo- 101P

(2hrs/week)

[ANIMAL DIVERSITY - NON CHORDATES]

1. **INVERTEBRATES** : Observation of the following slides/ specimens / models.

Protozoa – General characters & Outline classification upto Classes with examples.

Elphidium, Paramecium –binary fission & Conjugation.

Porifera -General characters & Outline classification upto Classes with examples

Spongilla, Euspongia, Sycon, Sycon – L.S, T.S.

Coelenterata - General characters & Outline classification upto Classes with examples.

Obelia Colony , Medusa, Physalia, Velella, Corallium, Gorgonia, Aurelia, Pennatula

Platyhelminthes - General characters & Outline classification upto Classes with examples

. Planaria, Larval stages of Fasciola– Miracidium, Redia, Cercaria, Echinococcus granulosus

Nemathelminthes - General characters & Outline classification upto Classes with examples.

Ascaris male & female, Ancylostoma duodenale.

Annelida - General characters & Outline classification upto Classes with examples.

Neries, Heteroneries, Aphrodite, Hirudo, Trochophore Larva.

Arthropoda - General characters & Outline classification upto Classes with examples.

Mouth parts of male & female Anopheles & Culex, Mouth parts of House fly,

Nauplius , Mysis , Zoa Larvae. Scorpion, Crab, Prawn , Scolopendra, Sacculina Limulus,

Peripatus.

Mollusca - General characters & Outline classification upto Classes with examples.

Chiton, Murex, Sepia , Loligo, Octopus, Nautilus, Glochidium larva.

Echinodermata - General characters & Outline classification upto Classes with examples.

Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Asterias. Bipinnaria larva.

Hemichordata- Balanoglossus, Tornaria larva.

Demonstration of dissection / dissected / Virtual Dissections.

1. Leech / Prawn / Scorpion / Crab - Digestive system .

2. Prawn - Appendages,

3. Prawn / Scorpion / Crab - Nervous system,

4. Pila / Unio – Digestive system,

5. Mounting of statocyst

6. Mounting of Radula.

Compulsory one species to be adopted for demonstration only by the faculty.

Computer Aided Techniques as per U.G.C Guidelines.

Laboratory record work shall be submitted at the time of Practical Examination.

EXTERNAL PRACTICAL- I
(Animal Diversity of Invertebrates) (2hrs/week)
MODEL QUESTION PAPER -I Code: ZOO-101P
EXTERNAL PRACTICAL- I

Time: 3 hrs.

Max.marks: 25m.

- | | |
|--|---------|
| I. Draw neat labeled diagram of Digestive system Leech. | 6M. |
| II .Draw neat labeled diagram of Radula of Pila. | 4M. |
| III. Spotters: Identify, draw labeled diagram & write notes on
A, B, C, D | 4X3=12M |
| 1. Viva. | 3M |
| TOTAL: ----- | 25M. |

Guide lines for the practical Examiners

- I. **List of dissections** : (8marks for diagram & 2 marks for labeling)
Leech/Prawn/Scorpion/Crab- Digestive system.
Prawn – Appendages.
Prawn / Scorpion /Crab- Nervous system
Pila / Unio – Digestive system.
- II.Mounting of Statocyst / Mounting of Radula. (Mounting 4 marks, labeled diagram 1 marks)

III.Spotters: 1Mark for identification, 1 Mark for labeled diagram & 3Mark for notes for each spotter.

Invertebrates: 4 specimens / slides / models.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
INTERNAL PRACTICAL- I

(2 hrs/week).

(Animal Diversity of Invertebrates)Code: ZOO-101P.

MODEL QUESTION PAPER -I

Max.marks:25M.

Time: 3hrs.

- | | |
|--|------------------|
| 1. Attendance ----- | 05M. |
| 2. Record ----- | 10M. |
| 3. Field note book. ----- | 05M |
| 4. Project (Within the syllabus) ----- | 05M. |
| | Total ----- 25M. |

Reference Books :-

1. Modern Text Book of Zoology - vertebrates..... R.L.Kotpal
2. A Text Book Zoology EkambarnathAyya

Objective of the course: To impart knowledge on the structural and functional aspects of cell, cell molecules that contribute to the mystery of life, basic structures of DNA, RNAs, their specific roles and genes that play vital role in transmission of parental characters to the offspring.

Course outcomes:

- ❖ This study will help students to understand the variation of species with its basic and functional unit that is the cell and its components.
- ❖ They learn more about the structure and functions of DNA and RNAs.
- ❖ Students will test and deepen their mastery of genetics by applying this knowledge in a variety of problem- solving situations.
- ❖ They get to know genes in depth level and their role in transmission of parental characters.
- ❖ Understand that evolution involves genetic change in the composition of populations, the process of allopatric speciation.

Unit – I

1.1 Cytology - I :-Electron microscopic structure of cell .

10 Hrs

1.2 Plasma membrane - Fluid mosaic model, Transport functions of plasma membrane (Active & Passive)

Unit – II 15 Hrs

2.1 Cell Organelles:- Structure and functions of Endoplasmic reticulum, Golgi body, Ribosome's, Lysosomes, Mitochondria.

2.2 DNA: Watson & Crick model, Semi Conservative Replication.

2.3 RNA - Structure, types & functions of RNA.

2.4 Chromosomes - Structure, types & functions, Giant Chromosomes (lamp brush & Polytene)

Unit – III 10 Hrs

3.1 Genetics-I:- Mendel's Laws of Inheritance, Incomplete dominance and co-dominance

3.2 Lethal alleles, Epistasis, Linkage and crossing over.

Unit – IV 15 Hrs

1.1 **Genetics – II** :- Sex determination - Genic balance theory / Bridges theory, Barr bodies.

1.2 Sex linked inheritance.

1.3 Extra chromosomal inheritance (Kappa particles in Paramecium)

1.4 Blood group inheritance.

Unit – V 10 Hrs

5.1.Evolution:- Origin of life, Hardy -Weinberg Equilibrium, Lamarckism, Darwinism, Neo – Darwinism

5.2 Isolation, Speciation (Allopatric and Sympatric).

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Semester - III

(Model question paper)

w.e.f.2019-2020

Title of the paper: Cytology, Genetic & Evolution.Code – Zoo-301C

Max. Marks: 70

Time: 3hrs.

Section – A4 x 5 = 20.

Answer any **four** questions. Each question carries **Five** marks. Draw neat labeled diagrams wherever necessary.

- 1.Cytoplasam.కణపదార్థము.
- 2.Fluid mosaic model. ద్రవమొజాయిక్కుమూనా.
- 3.Golgi body.గాల్జిదేహము.
- 4.Mitochondria.మైటోకాండ్రీయా.
- 5.Crossing Over.వినిమయము.
6. Linkage.సహలగ్నత
- 7.Barr bodies.బార్డేహములు.
- 8.Hardy- Weinberg law.హార్డివెయిన్బర్గ్నతము.

Section – B5 x 10 =50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

- 9.Describe the ultra structure of Eukaryotic cell?
యూకారియాటికూన్సక్షకణనిర్మాణంనువివరింపుము.
- 10.Give an account of structure and functions of Endoplasmic reticulum.
అంతర్జీవద్రవ్యజాలకంయొక్కనిర్మాణముమరియువిధులనుగూర్చివ్రాయుము.
- 11.Describe the structure and functions of plasma membrane.
ప్లాస్మాత్వచముయొక్కనిర్మాణముమరియువిధులనుగూర్చివ్రాయుము.
- 12.Explain the structure and types of chromosomes?
క్రోమోజోములనిర్మాణముమరియురకములనుగూర్చివ్రాయుము.
- 13.Describe the Mendel's laws of Inheritance?
మెండల్అనువంశికసూత్రములనుగూర్చివివరింపుము.
- 14.Write an essay on Epistasis.
ఎపిస్టాటిస్మార్చివ్యాసంవ్రాయుము.
- 15.Explain sex determination with the help of Balance theory.
లింగసంతులనుసిద్ధాంతంద్వారాలింగనిర్ధారణనువివరింపుము.
16. Write an essay on Isolation?
వివక్షతగూర్చివ్యాసంవ్రాయుము.

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Krishna Dt. A.P. (Autonomous)**

Semester - III

Guide lines to the Paper Setter.

W.e.f. 2019-2020

Title of the paper: Cytology, Genetic & Evolution Code – Zoo-301C

Time: 3hrs.

Max.marks:70

1. Answer any **four** questions out of eight in Section .A. Each question carries**five** marks. 4x5=20m.

2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10= 50M.

	PART	UNIT-I Cytology I	UNIT-II Cell Organelles	UNIT-III Genetics-I	UNIT-IV Genetics-II	UNIT-V Evolution
5 Marks Questions	A	1	2	1	2	2
10 Marks Questions	B	1	2	1	2	2
Weightage		15	30	15	30	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

Reference Books :-

1.A Test Book of zoology: Vikram modern series: E.Chakrapani.

2. Cytology, Genetics & Ecology :P.S.Verma&V.K.Agarwal.

3. Common core –A test Book of Zoology: Sri Vikas Publication : C. Gopal.

ZOOLOGY PRACTICAL SYLLABUS

PAPER – III

Class: II B.Scw.e.f 2019-2020

60 Hours/Week : 2

Credits: 2

Paper Title: Cytology, Genetics & Evolution.External: 25

Code : ZOO -301P C

Max.Marks:50

I. Cytology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chironomous*

II. Genetics

1. Study of Mendelian inheritance using suitable examples
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin's finches (pictures)
5. Visit to natural history museum and submission of report

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KRISHNA Dt., A.P. (AUTONOMOUS)**

PAPER – III

Cytology, Genetics & Evolution w.e.f.2019-20.

Model Question paper (External)Max.Marks: 25 M.

Paper Code: ZOO-301C

I.Cytology

1. Identify, draw neat labeled diagram & notes of the following stages. 2x2 ½= 5M.

A & B

II. Genetics

1. Genetics Problem. 5M.

2. Identify the following Chromosomes & Comment. 2x2 ½= 5M.

A & B

III. Evolution

1. Identify the given pictures and write the Comment. 2x2 ½= 5M

A & B

2. Identify the given pictures and Comment. 2x2 ½= 5M

A & B

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ZOOLOGY PRACTICAL -III**

(INTERNAL)

w.e.f. 2019-2020.

(2hrs/week).

Cytology, Genetics & Evolution Code: ZOO-301P.

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 5M.
2. Record ----- 10M.
3. Field trip & Field note book -----10M.

Total ----- 25M.

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KRISHNA Dt., A.P. (AUTONOMOUS)
PAPER – III**

Guide lines for the practical Examiner

Class: II B.Z.C

Paper Title: (Cytology, Genetics & Evolution)

Max.Marks: 25 M.

w.e.f.2019-20.

Paper Code: ZOO-301C

I.Cytology

1. Slide A from Mitosis & Slide B Meiosis. 2x2 ¹/₂= 5M.
(¹/₂ mark for identification, 1 mark for labeled diagram & 1 mark for comments)

II.Genetics

2. Checker board 2M.
Explanation 3M.
3. Identify & Comment on A& B (From Chromosomes). 2x2 ¹/₂= 5M
A-Identification – 1 M, Comment – 1¹/₂ M
B-Identification – 1 M, Comment – 1¹/₂ M

III.Evolution

4. Identify & Comment on A& B(A- fossil evidence, B – Homology & Analogy) 2x2 ¹/₂= 5M
A-Identification – 1 M, Comment – 1¹/₂ M
B-Identification – 1 M, Comment – 1¹/₂ M
5. Identify & Comment on A& B (A- Phylogeny of Horse, B – Darwin's Finches) 2x2 ¹/₂= 5M
A-Identification – 1 M, Comment – 1¹/₂ M
B-Identification – 1 M, Comment – 1¹/₂ M

(Zoology paper-V)

Class: III B.Sc (B.Z.C)

60 Hrs. (4hrs/week)

Credits :3

Title of the paper: Animal Biotechnology

w.e.f.- 2019-2020.

paper code:Zoo-501C

External :75

Objective of the course: To educate students on various biotechnological techniques involve in animal biotechnology, gene manipulations, their role in production of medicines and transgenic animals.

Course outcomes:

- ❖ Students are made to become aware of the use of technology that is involved in cloning.
- ❖ Improved quality of species with gene manipulations
- ❖ Recent development in biotechnology that helps for better environment and Production of various monoclonal antibodies and vaccines.
- ❖ Formation of different species - transgenic animals
- ❖ Resistant variety and better yield

Unit 1:Tools of Recombinant DNA technology - Enzymes and Vectors 15 Hrs.

1.1.Restriction modification systems : Types I, II and III- Nomenclature, Applications of Type II restriction enzymes in genetic engineering ,DNA polymerases, transferase, kinases and phosphatases,and DNA ligases

1.2 Cloning Vectors:: Properties of Cloning Vectors Plasmid vectors:pBR and pUC 18, Bacteriophage and, Cosmids.Artificial Chromosome Vectors: BACs, YACs,

Unit 2: Techniques of Recombinant DNA technology 15 Hrs

2.1 Cloning: Procedure of gene cloning, Use of linkers and adaptors.Microinjection, electroporation, biolistic

method (gene gun). PCR:- Basics of PCR,Principle and Procedure of PCR.

2.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing.

2.3 Southern, Northern and Western blotting. DNA finger printing,

UNIT 3 Animal Cell Technology 10 Hrs.

3.1 Cell culture media: Natural and Synthetic, Types Cell cultures-: primary culture, secondary culture. Continuous cell lines , Established Cell lines (common examples such as MRC, HeLa,CHO, BHK,

3.2 Cryopreservation of cultures, Hybridoma Technology:- Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

3.3.Stem cells: Types of stem cells- Embryonic and Adult Stem Cells, Diabetes and Parkinson's diseases.

Unit 4: Reproductive Technologies & Transgenic Animals 10 Hrs

4.1 Manipulation of reproduction in animals, Artificial Insemination, *In vitro* fertilization.

4.2 Super ovulation, Embryo transfer, Embryo cloning.

4.3 Transgenic Animals- Production of Transgenic Animals- sheep,fish.

Unit 5: Applied Biotechnology 10 Hrs.

5.1Industry: Fermentation- Different types of Fermentation. Submerged & Solid state, batch, Fed batch & Continuous (Short notes only)

5.2 Downstream processing - Filtration, centrifugation, chromatography, spray drying ,

5.3 Fisheries : Polyploidy in fishes

SEMESTER-V (Model Question paper)

Paper Title: Animal Biotechnology.

Paper Code : 501C

Answer **any five** questions out of eight in Part - A . Each question carries five marks. **5 X 5 = 25**

Part – B

1. Ligases లైగేజ్ లు
2. YACYAC
3. Southern Blotting సదరన్ బ్లాటింగ్
4. DNA Fingerprinting DNA వేలిముద్రలు
5. Applications of mAbmAb ప్రయోజనాలు
6. Polyploidy in fishes చేపలలో బహుస్థితికత
7. In vitro fertilization ఇన్ విట్రో ఫలధీకరణ
8. Chromatography క్రోమెటోగ్రఫీ

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on cloning vectors.
క్లోనింగ్ వాహకాల గూర్చి వ్యాసము వ్రాయుము.
10. Explain the role of Type II Restriction enzymes in genetic engineering.
జీవ సాంకేతిక శాస్త్రంలో టైప్ II రెస్ట్రిక్షన్ ఎంజైమ్ ల యొక్క పాత్రను గూర్చి వివరింపుము.
11. Define gene cloning .Describe the procedure of gene cloning in detail.
జన్యు క్లోనింగ్ ను వివరించి ,అది జరుగు విధానమును గూర్చి విపులంగా వ్రాయండి
12. What is PCR. Briefly describe various steps of PCR.
PCR.అనగా నేమి దానిలోని వివిధ దశల గూర్చి వ్రాయుము.
13. Define Stem Cell Technology ? Briefly describe about it.
మూలకణ సాంకేతికత అంటే ఏమిటి దాని గూర్చి విపులంగా వ్రాయండి.
14. Write in detail about the transgenic animals.
వివిధ రకాల కీణ్వణము గూర్చి వ్యాసము వ్రాయుము.
15. Write an essay on different types of fermentation.
జన్యు పరివర్తక జీవుల గూర్చి వివరించండి.
16. Briefly describe the technology of super ovulation and Embryo transfer in cattle's and discuss their applications and limitations.
పశువులలో ఉత్తమమైన అండజననము మరియు పిండము ప్రవేశ పెట్టుట వలన ప్రయోజనాలు మరియు వాటి పరిధులు గూర్చి వివరింపుము.

SEMESTER-V

Time :3 hrs

Max.Marks:75

Guide lines to the paper setter

Paper Title : Animal Biotechnology

Paper Code : 501C

Note : 1. Answer **any five** questions out of eight in Part-A . Each question carries five marks. 5 X 5 = 25M.

2. Answer **any five** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	25	20

Note: 1. Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

Reference Books :-

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing , Oxford,U.K

2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA

3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

ZOOLOGY PRACTICAL SYLLABUS

PAPER - V

Periods : 30Max.Marks:50

Credits :2

Code: ZOO-501P

Paper Title : Animal Biotechnology.

1. Genomic DNA isolation from *E. coli*.
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*.
3. Study the following techniques through photographs.
 - a. Southern blotting.
 - b. Western blotting.
 - c. DNA sequencing (Sanger's method)
 - d. DNA finger printing
4. PCR (demonstration) on site or of site demonstration.
5. Project report on animal cell culture.

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(AUTONOMOUS)

Animal Biotechnology)
Model Question Paper (**External**)

Max. Marks : 25
Paper Code : ZOO-501P

-
1. Identify the following Genomic DNA isolation from *E. coli*.5m
 2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* . 5m
 3. Study the following techniques given on photographs & Write notes on. 2x5=10
A & B
 4. PCR (demonstration) on site or of site demonstration. 5m

Total: 25m

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(AUTONOMOUS)

Guide lines for the Practical Examiners.

Class: III B.Z.C
Paper Title: Animal Biotechnology.
Max.Marks: 25 M.

w.e.f.2019-20.

Paper Code: ZOO-501C

1. Identify the following Genomic DNA isolation from *E. coli*.
(5 marks for Procedure)
2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* .
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. PCR (demonstration) on site or of site demonstration.
(5 marks for PCR demonstration)

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(AUTONOMOUS)

Practical – V
(Animal Biotechnology)
Model Question Paper (Internal)

w.e.f. 2019-20
Max. Marks : 25
Paper Code : ZOO-501P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book	--	10M
Total		-- 25M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA
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SEMESTER - V (CBCS)

(Zoology paper-VI)

Class: III B.Sc (B.Z.C)

w.e.f.-2017 -18

60 Hrs(6hrs/ week)

paper code:Zoo-502C

Credits :3

External : 75

Title of the paper: Animal Husbandry. Internal:25

Objective of the course: To help students to stand on their own legs, acquire skills in poultry and Dairy farms and to set up their own firms..

Course outcomes:

- ❖ Students are given awareness about different varieties of chicks.
- ❖ Students are familiarized with recent technologies those are applied to produce different species with variations which are more beneficial and income fetching.
- ❖ Students with the help of self help schemes, can set up their own firms, and provide
- ❖ employability to others and to tap the resources of Government and Nongovernmental sectors.
- ❖ They are given managerial and marketing skills as well.

UNIT – I :

10 Hours

- 1.1 General introduction to poultry farming, Principles of poultry housing. Poultry houses.
- 1.2 Systems of poultry farming.
- 1.3 Management of chicks, growers, layers, and Broilers.

UNIT – II:

10 Hours

- 2.1. Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers.
- 2.2. Methods of feeding- Whole grain feeding system, Grain and mash method, All mash method, Pellet feeding.
- 2.3. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III:

10 Hours

- 3.1 Selection, care and handling of hatching eggs, Egg testing.
- 3.2 Methods of hatching.
- 3.3 Brooding and rearing, Sexing of chicks.

UNIT- IV:

20 Hours

- 4.1 Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds.
- 4.2 Systems of inbreeding and crossbreeding.
- 4.3 Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn

UNIT - V:

10 Hours

- 5.1 Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.
- 5.2 Cleaning and sanitation of programme. Records to be maintained in a dairy farm.

(AUTONOMOUS)

SEMESTER-V (Model Question paper)

Paper Title : Animal Husbandry

Paper Code : Zoo-502C

Answer **any five** questions out of eight in Part - A . Each question carries five marks. **5 X 5 = 25**

1. Principles of poultry farming. కోళ్ళ పెద్దల్లో పాటించవలసిన ముఖ్యాంశాలు
2. Chick management. కోడి పిల్లల యాజమాన్యము
3. Poultry feed management . కోళ్ళ దాణా యాజమాన్యము
4. Marek's disease. మారెక్స్ వ్యాధి
5. Egg testing (Candle test) గుడ్డును పరీక్షించుట
6. Cleaning and sanitation of Dairy farm. డైరీఫారం యొక్క శుభ్రత మరియు శానిటేషన్
7. Milk record register డైరీఫారంలో నిర్వహించవలసిన రికార్డులు
8. Loose housing system లూజ్ హౌస్ సిస్టమ్

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on systems of poultry farming
ఫారాల్లో కోళ్ళను పెంచే వివిధ పద్ధతుల గురించి వ్యాసము వ్రాయుము
10. Write an essay on management of Broilers
బ్రాయిలర్ కోళ్ళ యాజమాన్య పద్ధతుల గురించి వ్యాసము వ్రాయుము
11. Write an essay on symptoms control and management of two viral and bacterial diseases.
వైరస్ మరియు బాక్టీరియా వల్ల కలుగు ఏదైన రెండు వ్యాధులు, లక్షణాలు, చికిత్స, నివారణలో యాజమాన్య పాత్ర పై వ్యాసము వ్రాయుము
12. Write an essay on methods of feeding in Poultry
కోళ్ళకు దాణా పెట్టు పద్ధతులను వివరిస్తూ వ్యాసము వ్రాయుము
13. Write an essay on different methods of hatching eggs
గుడ్డును పొదిగించే విధానాలను గురించి వ్యాసము వ్రాయుము
14. Give an account of breeds of Indian Cows
భారతదేశ గోజాతులపై ఒక వ్యాసము వ్రాయుము
15. Explain the vaccination programme in Cattle
పశువులలో టీకాలు వేయు పద్ధతుల గురించి వివరింపుము
16. write an essay on care and management of Calf, heifer and milk animals
లేగదూడల, దూడల మరియు పాలిచ్చే పశువులకు తీసుకోవలసిన జాగ్రత్తలు, యాజమాన్య పద్ధతుల పై వ్యాసము వ్రాయుము

SEMESTER-V

Time :3 hrs

Max.Marks:75

Guide lines to the paper setter

Paper Title : Animal Husbandry.

Paper Code : 502C

Note : 1. Answer **any five** questions out of eight in Part-A . Each question carries five marks.5 X 5 = 25M.

2. Answer **any five** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	2	1
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	30	15

Note: 1. Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

Text Books :-

1. Animal Husbandry: ---- Technical Test paper.
2. Poultry- Technical Revised Common Core .
3. Animal Husbandry --- Dr.K.Kondaiah, A.V.N.Gupta.

ZOOLOGY PRACTICAL SYLLABUS

Period : 30

PAPER – VI

Max.Marks:50

Credits :2

Paper Title : Animal Husbandry Paper Code :Zoo-502P

1. Study of various breeds of layers and broilers (photographs)
2. Identification of disease causing organisms in poultry birds (as per theory)
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
5. Study of various breeds of cattle (photographs/microfilms)
6. Study of various activities carried out in a dairy farm and submission of a report.

A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165, KRISHNA Dt., A.P. (AUTONOMOUS)

Practical - VI
(Animal Husbandry) Max. Marks : 50

w.e.f. 2017 - 18

Model Question Paper (**External**)

Paper Code : ZOO-502P

- | | |
|--|-------------------------------------|
| 1. Study of various breeds of layers and broilers (photographs)
A & B | 2X2 ¹ / ₂ =5M |
| 2. Identification of disease causing organisms in poultry birds (as per theory)
A & B | 2X2 ¹ / ₂ =5M |
| 3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration) | 5M |
| 4. Study of various breeds of cattle (photographs/microfilms)
A & B | 2X5=10M |

Total -- 25M

A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE,VUYYURU - 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)

w.e.f.2017-18

Guide lines for the Practical Examiners.Max.Marks: 25m

Class: III B.Z.C

Paper Code : ZOO-502C

Paper Title: (Animal Husbandry)

1. Identify and comment on A & B (Charts / Photographs).
(Identification - $\frac{1}{2}$ mark & Comments -2m)
2. Identify and comment on A & B (Charts / Photographs
(Identification - $\frac{1}{2}$ mark & Comments -2m)
3. Demonstration : (4 marks for diagram & 1 marks for labeling)
4. Identify and comment on A & B (Photographs/ microfilms).
(Identification -1 mark & Comments -4m)

A.G& S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE,VUYYURU - 521165, KRISHNA
Dt., A.P. (AUTONOMOUS)

Practical - VI w.e.f. 2017 - 18

Animal HusbandryMax. Marks : 50

Model Question Paper **Internal** Paper Code : ZOO-502P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book (Any one)	--	10M

Total -- 25M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-**
(Autonomous)

Accredited by NAAC with "A" Grade

2019-20



DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES

16- 10 -2019 (EVEN SEMESTER)



2

Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10.30 AM on 16-10-2019 in the Department of Zoology.

Smt.D.A. Kiranmayee.

Presiding

Members Present:

- 1) S. Aruna Kiranmayee 16/10/19 Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee.) 16/10/19 A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2) J.N. Lavanya Latha University Nominee Dr. J.N.Lavanya Latha,
(Dr.J.N.Lavanya Latha.) 16/10/19 Krishna University,
Machilipatnam.
- 3) K. Daniel Academic Council Head, Department of Zoology,
(Dr. K.Daniel.) 16/10/19 Nominee JKC College,
Guntur,
- 4) B. Elia Academic Council Head, Department of Zoology,
(B.Elia.) 16/10/19 Nominee Gov. Degree College,
Pitapuram.
- 5) M. Lakshmi Priyanka Member Lecturer in Zoology,
(kum.M.Lakshmi Priyanka.) 16/10/19 A.G&S.G.S Degree College
Vuyyuru-521165.
- 6) B. Appala Naidu Industrialist Asst. Project Manager,
(B. Appala Naidu.) 16/10/19 RGCA
Manikonda.
- 7) Ch. Chiranjeevi Student Represent P.hd -Research Scholar,
(Ch.Chiranjeevi.) 16/10/19 Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of I B.Sc (B.Z.C) for the academic year 2019-20.
2. To recommend the syllabi (Theory & Practical), Model question paper for IV Semester of II B.Sc (B.Z.C) for the academic year 2019-2020.
3. To recommend the syllabi (Theory & Practical), Model question paper for General Elective -A & Cluster Elective - B to the VI Semester of III B.Sc (B.Z.C) for the academic year 2019-20.
4. To recommend the Blue print for the semester end exam for IV semester of II year. To followed by Blue print for VI semester.
5. To recommend the syllabi (Theory & Practical), Model question paper and Blue print of II semester of I B.Sc for the academic year 2019-20.
6. To recommend a Certificate course on Organic farming to IV semester of II year for the academic year 2019-2020.
7. To recommend the teaching and evolution methods to be followed under Autonomous statues.
8. Any other matter.

B. Arunakishanmayee
Chairman. 16/10/19

RESOLUTIONS

1. It is resolved to continue the same syllabi (Theory & Practical), model question paper of II semester of I B.Sc. (B.Z.C), under Choice Based Credit System (CBCS) for the academic year 2019 – 20.
2. It is resolved to continue the same syllabi (Theory & Practical) , for IV semester of II B.Sc. (B.Z.C) and to be followed the model paper (70:30) for IV semester of II B.Sc.(B.Z.C)
3. It is resolved to continue the same syllabi (Theory & Practical), model papers of under Choice Based Credit System (CBCS) to VI semester General Elective – A (Immunology) and Cluster Elective – B (Principles of Aquaculture, Aquaculture Management, Postharvest Technology.) to the VI semester of III B.Sc (B.Z.C) for the academic year 2019 – 20.
4. It is resolved to follow the Blue prints of II, IV semesters of I,II for the academic year, 2019-20. It is resolved to continue the same Blue print to VI semester of III B.Sc.(B.Z.C).
5. It is resolved to follow the Model question paper and Blue print of II semester of I B.Sc for the academic year 2019-20.
6. It is resolved to implement certificate course for IV semester of II Year.
7. It is resolved to continue the following teaching & evolution methods for the Academic year 2019-20.
8. Any other matter.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

Evaluation of a student is done by the following procedure:

- **Internal Assessment Examination:**
- Out of maximum 100 marks in each paper for II, IV B.Sc , 30 marks shall be allocated for internal assessment.
- Out of these 25 marks , 15 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidates percentage of attendance and remaining 5 marks are allocated for the assignment for III B.SC.
- **Semester – End Examination:**
- The maximum mark for I, II B.Sc semester – End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams/ obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “ PASS ” .
- The maximum marks for III B.Sc semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers , these examinations are conducted at the end of II, IV, & VI semester for I,II & III B.Sc.

OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU - 521165, KRISHNS Dt., A.P.

ZOOLOGY

SEMESTER - II w.e.f. - 2018 - 19

Class : I B.Sc

(Code : ZOO -201 C)

No. of Hours per week : 4

Max.Marks: 70

Credits : 3

Title of the Paper : Biology of Chordates

UNIT - I

15hrs.

1.1. Prochordata.

1.1.1. Structure of *Branchiostoma*.

1.1.2. Affinities of Cephalochordata.

1.1.3. Structure and Life History of *Herdmania*.

1.1.4. Significance of Retrogressive metamorphosis.

UNIT - II

15hrs.

2.1.Cyclostomata

2.1. Differences between Petromyzonand *Myxine*.

2.2. Pisces.

2.2.1.*Scoliodon*- External features, Digestive System, Respiratory System, Heart, Brain.

2.2.2. Migration in Fishes.

2.2.3. Dipnoi.

UNIT - III

10hrs.

3.1.Amphibia

3.1.1. *Rana hexadactyla* - External features, Digestive System, Respiratory System, Heart, Brain.

3.1.2.Parental care in Amphibians

3.2.Reptilia

3.2.1. Calotes - External features, Digestive System, Respiratory System, Heart, Brain.

UNIT - IV

12hrs.

4.1.Aves

4.1.1. *Columba livia* - Exoskeleton, Digestive System, Respiratory System, Heart, Brain.

4.1.2.Migration in Birds

4.1.3.Flight adaptations in Birds

UNIT - V

8hrs.

5.1.Mammalia

5.1.1. Differences between Prototheria & Metatheria.

5.1.2. Dentition in Mammals.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - II

(Model question paper)

Title of the paper: Biology

of – Chordates.

Code – Zoo-201C Time: 3hrs.

Max. Marks: 70.

Section – A 4 x 5 = 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

1. Structure of Branchiostoma.
2. Migration in Fishes.
3. Arterial system in Scoliodon.
4. Parental care in Amphibians.
5. Structure of heart in Calotes.
6. Types of feathers in Birds.
7. Flight adaptations in Birds.
8. Prototheria.

Section – B 5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. What is Retrogressive Meta morphosis? Describe this process in life history of Herdmania?
10. Differentiate between Petromyzon and Myxine?
11. Give an account of Dipnoi fishes.?
12. Describe the structure and working of heart in Rana?
13. Give an account of brain of Calotes?
14. Write an essay on migration in birds?
15. Explain the respiratory system of Columba livia?
16. Write an essay on Dentition in mammals?

**A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
Semester - II**

Zoology

Guide lines to the

Paper Setter.

Title of the paper: Biology of – Chordates.Code – Zoo-201C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **five** questions out of eight in Section – A. Each question carries **four** marks.5x4 = 20M

2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10= 50M

	Section	UNIT-I (Prochordata)	UNIT-II (Cyclostomata & Pisces)	UNIT-III (Amphibia & Reptilia)	UNIT-IV (Aves)	UNIT-V (Mammalia)
5 Marks Questions	A	1	2	2	2	1
10 Marks Questions	B	1	2	2	2	1
Weightage		15	30	30	30	15

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165,
KRISHNA Dt., A.P. (AUTONOMOUS)

ZOOLOGY
PRACTICAL - II

w.e.f. 2018 - 2019

I B.Sc

Code : ZOO - 201P C

Hours / Week: 2

Max. Marks: 50

Credits: 2

External : 25

PAPER TITLE: ANIMAL DIVERSITY OF CHORDATES

Observation of the following slides / specimens / models:

Protochordata: Salient features of Urochordata & Cephalochordata.
Herdmania, Amphioxus, Amphioxus T.S. through pharynx.

Cyclostomata : General Characters of Cyclostomes.
Petromyzon, Myxine.

Pisces : General Characters & Classification upto Sub- Class level.
Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echeneis & Labeo
Types of Scales: Placoid scale, Cycloid scale, Ctenoid scale.

Amphibia : General Characters & Classification upto Order level.
Ichthyophis, Amblystoma, Siren, Hyla, Rachophorus, Axolotl larva.

Reptilia : General Characters & Classification upto Order level.
Draco, Chamaeleon, Uromastix, Russels viper, Naja, Bungarus, Enhydrina & Testudo.

Aves : General Characters & Classification upto Sub- Class level.
Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo.

Mammalia : General Characters & Classification upto Sub- Class level.
Ornithorynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog.

Osteology : Appendicular skeletons of Varanus, Pigeon, Rabbit – Skull, Fore limbs, Hind limbs .

Demonstration of dissection / dissected / virtual dissection:

1. V, VII, IX, X Cranial nerves of shark / locally available fishes.
2. Arterial system, venous system of Shark / Calotes / Fowl / Rat.
3. Digestive system of fish.

- Laboratory record work shall be submitted at the time of practical examination.
- Compulsory one species to be adopted for demonstration only by the faculty.

**A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
EXTERNAL PRACTICAL- II**

**(Animal Diversity of vertebrates) (2 hrs/week)
MODEL QUESTION PAPER -II Code: ZOO-201P**

Credits: 2.

Max.marks: 25m.

Time: 3 hrs.

- | | |
|---|---------|
| 1. Draw neat labeled diagram of IX & X Cranial nerves of Shark. | 7M |
| 2. Spotters: Identify , draw labeled diagram & write notes on
A, B, C, D & E | 5X3=15M |
| 3. Viva. | 3M |
| TOTAL: | 25M. |

Guide lines for the practical Examiners

I. List of dissections : (5marks for diagram & 2 marks for labeling)

1. V, VII, IX, X Cranial nerves of shark/ locally available fishes.
2. Arterial system, venous system of shark/ Calotes/Fowl/Rat.
3. Digestive system of fish.

II. Spotters: 1Mark for identification, 1 Mark for labeled diagram & 1 Mark for notes for each spotter.

Chordata: 4 Specimens / Slides / Models

(Prochordates, Fishes, Amphibians, Reptiles, Birds&Mammals)

Bone -1.

**A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
INTERNAL PRACTICAL- II**

w.e.f. 2019-2020.

(2hrs/week).

(Animal Diversity of vertebrates)Code: ZOO-201P.

MODEL QUESTION PAPER -II

Max.marks:25M.

Time: 3hrs.

- | | | |
|-----------------------------------|-------|------|
| 1. Attendance | ----- | 5M. |
| 2. Record | ----- | 10M. |
| 3. Project (Earn while you learn) | ----- | 10M. |

Total ----- 25M.

Title of the Paper: Embryology, Physiology and Ecology.

Unit – I (Embryology)

1.1 Developmental Biology and Embryology

- 1.1.1 Gametogenesis (Spermatogenesis, Oogenesis in mammals)
- 1.1.2 Fertilization
- 1.1.3 Types of eggs
- 1.1.4 Types of cleavages

1.2 Foetal membranes in Chick

1.3 Development - types and functions of Placenta in mammals.

2.1 Physiology - I

- 2.1.1 Elementary study of digestive process.
- 2.1.2 Absorption of digested food.
- 2.1.3 **Respiration** – Structure of mammalian Lung & Mechanism of respiration, transport of oxygen and carbon dioxide
- 2.1.4 **Circulation** - Structure and functioning of mammalian heart, Cardiac cycle.
- 2.1.5 **Excretion** - Structure of nephron, urine formation, counter current mechanism.

Unit – III (Physiology - II)

3.1 Physiology - II

- 3.1.1 Structure & functional properties of Nerve Cell; Production & propagation of nerve Impulse. Synaptic transmission.
- 3.1.2 Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle Contraction.
- 3.1.3 Endocrine glands - Structure, secretions and the functions (of hormones) of Pituitary, Thyroid, parathyroid, adrenal glands and pancreas.
- 3.1.4 Hormonal control of reproduction in Mammals.

Unit – IV(Ecology – I)

4.1Ecology-I

- 4.1.1 Abiotic factors of Ecosystem – Temperature & Light.
- 4.1.2 Nutrient cycles - Nitrogen, Carbon and Phosphorus.
- 4.1.3 Energy flow in ecosystem.

Unit – V (Ecology – II & Zoogeography)

5.1 Ecology - II.

- 5.1.1. Community interactions - Mutualism, commensalism, parasitism.
- 5.1.2. Ecological succession.

5.2 Zoogeography 5.2.1 5.2.1. Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru
Krishna Dt. A.P. (Autonomous)**

Semester – IV

Time: 3hrs.

Max. Marks: 70.

Section – A4 x 5 = 20M.

Answer any **four** questions. Each question carries **Five** marks. Draw neat labeled diagrams wherever necessary.

- 1.Types of eggs.
- 2.Foetal membranes.
- 3.Counter current mechanism.
- 4.Synaptic transmission.
5. Pancreas.
- 6.Energy flow in Ecosystem.
7. Mutualism.
- 8.Parasitism.

Section – B5 x 10 =50M.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

- 9.Describe the process of Fertilization.
- 10.Write an essay on placenta.
- 11.Explain the mechanism of transport of oxygen and Carbon –dioxide in blood of mammals.
- 12.Describe the structure and working of mammalian heart.
- 13.Explain the structure and functions of pituitary gland.
- 14.Describe the Carbon and Nitrogen cycle.
- 15.Describe the process of Ecological succession in a pond.
- 16.Give an account of the fauna of oriental region.

**A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
Krishna Dt. A.P. (Autonomous)**

Semester - IV

Zoology

Guide lines to the Paper Setter.

Title of the paper: Embryology,

Physiology and Ecology.

Code – Zoo-401C

Time: 3hrs.

1. Answer any **four** questions out of eight in Section .A. Each question carries five marks.
4x5=20m.

2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10=50M.

	PART	UNIT-I Embryology	UNIT-II Physiology-I	UNIT-III (Physiology -II)	UNIT-IV Ecology-I	UNIT-V (EcologyII, Zoogeogra phy)
5 Marks Questions	A	2	1	2	1	2
10 Marks Questions	B	2	2	1	1	2
Weightage		30	25	20	15	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

A.G& S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE,VUYYURU - 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)

ZOOLOGY PRACTICAL SYLLABUS
SEMESTER - IV

PAPER – IV

w.e.f : 2019 - 20

Periods: 24Max. Marks: 50

Paper Title: Embryology,Physiology & Ecology Paper Code : 401P

I. Embryology

1. Study of T.S. of testis, ovary of a mammal.
2. Study of different stages of cleavages (2, 4, 8 cell stages).
3. Study of chick embryo of 18 hours, 24 hours, 33 hours and 48 hours of incubation.

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats.
2. Qualitative tests for identification of ammonia, urea and uric acid.
3. Study of activity of salivary amylase under optimum conditions.
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage.

III. Ecology

1. Determination of pH of given sample.
2. Estimation of dissolved oxygen of given sample.
3. Estimation of total alkalinity of given sample.
4. Estimation of salinity of given sample.

A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)
PAPER – IV

(Embryology, Physiology & Ecology)

Model question paper (External)w.e.f.2019-20.

Max.Marks: 25 M.

Paper Code: ZOO-401C

I.Embryology:

1. Identify, draw neat labeled diagram & comment on . $1\frac{1}{2} \times 2 = 3M.$ **A & B**

II. Physiology

2. Identify, draw neat labeled diagram & comment on . $1\frac{1}{2} \times 2 = 3M.$ **A & B**
3. Identify the organic substances in the given samples A & B, each with two tests. 4x $1\frac{1}{2}$ = 6M.
(Sample A- $2 \times 2\frac{1}{2} = 5$ Marks & sample B -- $2 \times 2\frac{1}{2} = 5$ Marks)
4. Identify the Excretory products in the given samples A & B, each with two tests. 4x $1\frac{1}{2}$ = 6M.
(Sample A- $2 \times 2\frac{1}{2} = 5$ Marks & sample B -- $2 \times 2\frac{1}{2} = 5$ Marks)

III. Ecology:

5. Determine the P^H of given sample. 1x2=2M.
6. Estimate the dissolved oxygen in the given sample. 1x5=5M.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
ZOOLOGY PRACTICAL -IV
(INTERNAL)

(Embryology,Physiology &Ecology) w .e.f. 2019-2020.

(2hrs/week).

Code: ZOO-401P.

Max.marks:25M

Time: 3hrs.

- | | | |
|---------------|-------|------|
| 1. Attendance | ----- | 5M. |
| 2. Record | ----- | 10M. |
| 3. Assignment | ----- | 10M. |

Total ----- 25M.

SEMESTER - VI

ZOOLOGY –ELECTIVE PAPER: VII-(A)

Class IIIB.Sc

w.e.f.- 2017- 18

Paper Code : ZOO -601C

60 Hrs.

Paper code: Zoo-601GEEexternal: 75

25

Immunology.

Objective of the course: To facilitate students to understand the role of immune system in the body, cells and organs of immune system, their structures and functioning.

Course outcomes:

- ❖ Students grow in understanding of immune system, to improve their immunity and to protect them from pathogens.
- ❖ They identify their blood groups, their compatibility and the need to donate blood to save life.
- ❖ Students identify the classes, structures and functions of antibodies, antigen –antibody reactions.
- ❖ This study enables students to take care of themselves and take timely precautions against various disease.
- ❖ They identify the cure of different diseases through various vaccines, the instruments involved in identification of immune reactions etc.

Unit I:

1.1 Overview of Immune system

1.1.1 Introduction to basic concepts in Immunology.

1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system

1.2.1 Cells of immune system

1.2.2 Organs of immune system

Unit II:

2.1 Antigens

2.1.1 Basic properties of antigens

2.1.2 B and T cell epitopes, haptens and adjuvants

2.1.3 Factors influencing immunogenicity

Unit - III :

3.1 Antibodies

3.1.1 Structure of an antibody

3.1.2 Classes and functions of antibodies

3.1.3 Antigen and antibody interactions.

3.1.4 Monoclonal antibodies and their production.

Unit - IV

4.1 Working of an Immune system

4.1.1 Structure and functions of major histocompatibility complexes

4.1.2 Exogenous and Endogenous pathways of antigen presentation and processing

4.1.3 Basic properties and functions of mediator molecules. (cytokines, interferons and complement proteins).

4.1.4 Mechanisms of humoral and cell mediated immunities

Unit - IV

5.1 Immune system in health and disease

5.1.1 Classification and brief description of various types of hyper sensitivities

5.1.2 Introduction to concepts of autoimmunity and immunodeficiency

5.2 Vaccines

5.2.1 General introduction to vaccines

5.2.2 Types of vaccines

KRISHNA Dt.,A.P. (AUTONOMOUS)
SEMESTER-VI (Model Question paper)

Paper Title: Immunology

Paper Code:ZOO-601GE

SECTION-A

Answer **any five** questions out of eight in Part - A. Each question carries five marks. **5 X 5 =**

1. Active immunity
2. Monoclonal antibodies.
3. TCell Epitope
4. Structure of antibody.
5. Functions of major histocompatibility complexes(MHC)
6. Humoral immunity.
7. Causes of autoimmune diseases.
8. BCG Vaccine .

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries ten marks. **5 X 10 = 50**

9. Give an account of innate immunity.
10. Write an essay on primary lymphoid organs.
11. Discuss about the basic properties of Antigen.
12. Write an essay on immunogenicity.
13. Describe about different types of immunoglobulines.
14. Give an account of basic properties and functions of Cytokines.
15. Define Hypersensitivity . Explain it in detail.
16. Explain different types of vaccines.

A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)

ZOOLOGY PRACTICAL SYLLABUS

Period: 24 PAPERS – VI
Max.Marks:50
Credits: 2
Paper Code: ZOO-601GE (P)
Paper Title: Immunology.

1. Demonstration of lymphoid organs (as per UGC guidelines).
2. Histological study of spleen, thymus and lymph nodes (through prepared slides).
3. Blood group determination.
4. Demonstration of
 - a. ELISA
 - b. Immuno-electrophoresis

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(AUTONOMOUS)

SEMESTER-VI
ZOOLOGY ELECTIVE PAPER-VII (A)

Time: 3 hrs

Max.Marks:75

Guide lines to the paper setter
Paper Title:Immunology. Paper Code: ZOO-601GE

Note: 1. Answer **any five** questions out of eight in Part-A. Each question carries five marks.5 X 5= 25M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks5 X 10= 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	1	1	2	2	2
10 Marks Questions	B	2	2	1	1	2
Weightage		25	25	20	20	30

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

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**A.G& S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)
(Immunology) *Max.marks:25m***

Model Question Paper (External) Paper Code: ZOO-601GE (P)
Practical - V

1. Demonstration of lymphoid organs (as per UGC guidelines) 5m
 2. Blood group determination 5m
 3. Study the following techniques given on photographs & Write notes on. 2x5=10m
A & B
 4. ELISA & Immunoelectrophoresis (demonstration) on site or of site demonstration. 5m
- Total: 25m.

Guide lines for the Practical Examiners.

1. Demonstration of lymphoid organs
(5 marks for Procedure)
2. Blood group determination.
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. ELISA (demonstration) on site or of site demonstration.

(5 marks for ELISA demonstration)

A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)

(Immunology) *Max. Marks: 25*

Model Question Paper (Internal)

Practical - V

Paper Code: ZOO-601GE (P)

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
Total	--	25M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU- 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C)

(Cluster Elective Paper: VIII-B-1)

w.e.f. –2017-18

60 Hrs(4hrs/ week)

Paper Code : ZOO-602CE

Credits : 3

External : 75

Title of the Paper: Principles of Aquaculture.

Internal: 25

Objective of the course: To introduce students into aquaculture practices

Course outcomes:

- ❖ Students get wider knowledge on aquaculture
- ❖ The study of students Types of Aquaculture ,culture systems and Culture Practices
- ❖ They learn about design and construction of aqua farms(pond formation)
- ❖ They study various economically important species
- ❖ Students get acquainted with sea weed and their benefits.

UNIT –I

- 1.1 Introduction / Basics of Aquaculture: - Definition, Significance and History of Aquaculture
- 1.2 Present status of Aquaculture – Global and National scenario
- 1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.
- 1.4 Criteria for the selection of species for culture

Unit – II

- 2.1 Types of Aquaculture:-** Freshwater, Brackishwater and Marine
- 2.2 Concept of Monoculture, Polyculture, Composite culture, Monosex culture and Integrated fish farming
- 2.2 Culture systems :-** Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems
- 2.3 Culture practices :-** Traditional, extensive, modified extensive, semi-intensive and intensive cultures of Fish and shrimp.

Unit – III

- 3.1 Design and construction of aqua farms :-**Criteria for the selection of site for freshwater and brackish water pond farms, Design and construction of fish and shrimp farms
- 3.2 Seed resources :-** Natural seed resources and Procurement of seed for stocking: Carp and shrimp
- 3.3 Nutrition and feeds :-** Nutritional requirements of a cultivable fish and shellfish
- 3.4 Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

- 4.1 Management of carp culture ponds:-** Culture of Indian major carps: Pre-stocking management – Dewatering, drying, Predators, weeds and algal blooms and their control, Liming and Fertilization; Stocking management – Stocking density and stocking; Post-stocking Management – Feeding, waterquality, growth and health care; and harvesting of ponds
- 4.2 Culture of giant freshwater prawn, *Macrobrachium rosenbergii***

Unit – V

- 5.1 Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*)**
- 5.2 Culture of pearl oysters**
- 5.3 Culture of seaweeds-**species cultured, culture techniques, important by-products, prospects
- 5.4 Culture of ornamental fishes –** Setting up and maintenance of aquarium; and breeding

SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-1

Time: 3 hrs

Max.Marks:75

Paper Title: Principles of Aquaculture.

Paper Code: ZOO-602CE

Part - A

Answer **any five** questions out of eight in Part - A. Each question carries five marks. **5 X 5 = 25**

- 1.Aquaculture History
- 2.NationalStatus of Aquaculture.
- 3.Monoculture.
- 4.Cage culture
- 5.Criteria for selection of site for fresh water culture.
- 6.Seed resources of carp fish.
7. Pre- Stocking Management of carps.
8. Byproducts of sea weeds.

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries Ten marks. **5 X 10 = 50**

- 9.Describe any three cultivable species of fresh water ponds.
- 10.Write the criteria for the selection of species for culture.
- 11.Write an essay on water recirculated system.
- 12.Write an essay on types of Aquaculture which you have studied.
- 13.Give an account of design and construction of Aquaculture.
- 14.Explain natural and artificial feeds and their importance in fish feeding.
- 15.Give an account of post- stock Management of carps.
- 16.Give an account of culture of penaeus monodon.

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU- 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

**SEMESTER-VI
Cluster Electives paper –VIII-B-1**

**Guide lines to the paper setter Time: 3 hrs
Max.Marks:75**

Paper Title:

Principles of Aquaculture.

Paper Code: ZOO-602CE

Note: 1. Answer **any five** questions out of eight in Part-A. Each question carries five marks. 5 X 5 = 25M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

SEMESTER - VI (CBCS)

w.e.f. - 2017 - 18

Class: III B.Sc (B.Z.C)

(Cluster Elective Paper: VIII-B-2)

60 Hrs. (4hrs/Week)

Paper Code : ZOO-603CE

Credits : 3

External : 75

Title of the Paper: Aquaculture

Management.

Objectives of the course: To instruct students on aquaculture managerial skills.

Course out comes:

- ❖ Students get know about breeding technology of fishes, Hatching and hatching methodology.
- ❖ Students learn to analyse the quality of water and soil.
- ❖ They are trained on feed storage, Feeding strategies: Feeding devices, feeding schedules and ration size.
- ❖ They gain knowledge on diseases of fish and shrimp and the strategies involved in marketing.
- ❖ They study economics and Marketing , **Fisheries Extension and** important of fish genetics.

Unit – I

1.1 Breeding and Hatchery Management:- Bundh Breeding and Induced breeding of carp by Hypophysation;
and Use of synthetic hormones.

1.2 Types of fish hatcheries; Hatchery management of Indian major carps

1.3 Breeding and Hatchery management of *Penaeus monodon*/ *Litopenaeus vannamei*

1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management:- Water quality and soil characteristics suitable for fish and shrimp culture

2.2 Identification of oxygen depletion problems and control mechanisms in culture ponds

2.3 Liming materials, Organic manures and Inorganic fertilizers commonly used and Their implications in fish

ponds

Unit – III

3.1 Feed Management :- Live Foods and their role in shrimp larval nutrition.

3.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives;

role of probiotics. Feed formulation and manufacturing; Feed storage

3.3 Feeding strategies: Feeding devices, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

Unit – IV

4.1 Disease Management :- Principles of disease diagnosis and health management;

4.2 Prophylaxis, Hygiene and Therapy of fish diseases

4.3 Specific and non-specific defense systems in fish; Fish immunization and Vaccination

4.4 Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

4.5 Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases in shrimp ponds

Unit – V

5.1 Economics and Marketing :- Principles of aquaculture economics – variable costs, cost-benefit analysis ,Fish marketing methods in India; Basic concepts in demand and price analysis.

5.2 Fisheries Extension : Fisheries Training and Education in India; Role of extension in community development.

5.3 Fish Genetics Genetic improvement of fish stocks – Hybridization of fish.

Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes,

SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-2

Time: 3 hrs

Max.Marks:75

Paper Title: Aquaculture Management. Paper Code: ZOO-603CE

Part - A

1. Answer **any five** questions out of eight in Part - A. Each question carries five marks. **5 X 5 = 25**

1. Bundh Breeding.
2. Types of hatcheries.
3. Liming Material.
4. Organic Manures.
5. Feed evaluation.
6. Supplementary feeds.
7. Symptoms of fish diseases
8. Gynogenesis.

Part – B

2. Answer **any five** questions out of eight in Part – B. Each question carries ten marks. **5 X 10 = 50**

9. Describe the induced breeding of carps by Hypophyostion
10. Give an account of breeding and Hatchery management of panaeus monodon
11. Describe the water quality characteristics of fish ponds.
12. Describe the identification of oxygen depletion problems and control mechanisms in culture ponds.
13. Give an account of Feed formulation and manufacturing.
14. Write an essay on feeding strategies.
15. Describe symptoms therapy and prophylaxis of any three diseases related to prawn.
16. Write an essay on Transgenic fish.

SEMESTER-VI
Cluster Electives paper –VIII-B-2

Guide lines to the paper setter Time: 3 hrs
Max.Marks:75

Paper

Title:Aquaculture Management **Paper Code:** ZOO-603CE

*Note:*1. Answer **any five** questions out of eight in Part-A. Each question carries five marks. 5 X 5 = 25M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks.5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	1	2	1	2
10 Marks Questions	B	2	2	2	1	1
Weightage		30	25	30	15	20

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C)
Hrs (4hrs/Week)
Credits: 3

(Cluster Elective Paper: VIII-B-3)
Paper Code: ZOO-604CE

w.e.f. - 2017 - 1860

External: 75

Internal: 25 **Title**

of the Paper: Postharvest Technology.

Objective of the course: To prepare students to become future aqua culturists.

Course out comes:

- ❖ Students are given techniques to handle fresh fish, storage, preservation and transport.
- ❖ They learn to extract maximum from fish and produce fish products.
- ❖ They can earn while they learn.
- ❖ They are taught rules and regulations pertaining to quality control.
- ❖ Students get know about Quality Assurance, Management and Certification

Unit – I

1.1 Handling and Principles of fish Preservation :- Handling of fresh fish, storage and transport of fresh fish,

post mortem changes (Rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, use of salt, use of fish preservatives, exposure to low radiation.

Unit – II

2.1 Methods of fish Preservation :- Traditional methods - sun drying, salt curing, pickling and smoking.

2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

3.1 Processing and preservation of fish and fish by-products :- Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, petfood from trash fish, fish manure.

3.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.3 Seaweed Products :- Preparation of agar, algin and carrageen. Use of seaweeds as food for human consumption.

Unit – IV

4.1 Sanitation and Quality control :- Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

4.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

4.3 Regulatory affairs in industries

Unit – V

5.1 Quality Assurance, Management and Certification :- Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

5.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System.

SEMESTER-VI (Model Question paper)

Cluster Electives paper –VIII-B-3

Time: 3 hrs Max.Marks:75

Paper Title: Postharvest Technology. Paper Code: ZOO-604CE

Part - A

Answer **any five** questions out of eight in Part - A. Each question carries five marks. **5 X 5 = 25**

1. Storage of fish.
2. Exposure of fish to low radiation of gamma rays.
3. Accelerated freeze drying.
4. Pickling of fish
5. Fish oils.
6. Fish meal.
7. Pre- processing control of fishery products.
8. Codex Alimentarius.

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries ten marks. **5 X 10 = 50**

9. Write the principles of fish preservation.
10. Write about spoilage in marine fish and fresh water fish.
11. Write about the Traditional methods of fish preservation like sun drying ,salt curing and smoking .
12. Give an account of advanced methods of preservation like chilling, freezing & canning.
13. Write an essay on any five fish byproducts.
14. Explain how sea weeds are useful in disease treatment and preparation of therapeutic drug.
15. Write an essay on environmental hygiene in processing plants.
16. Explain about the concept of hazard analysis & critical control points in sea food safety.

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(AUTONOMOUS)**

**SEMESTER-VI
Cluster Electives paper –VIII-B-3**

**Guide lines to the paper setter Time: 3 hrs
Max.Marks:75**

Paper Title:Postharvest Technology.**Paper Code: ZOO-604CE**

*Note:*1. Answer **any five** questions out of eight in Part-A. Each question carries five marks.5 X 5 = 25M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks.5 X 10 = 50M.

	PART	Unit –I	Unit – II	Unit-III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

ZOOLOGY PRACTICAL

Credits:2 Periods : 24

Max.Marks:50 Paper Title : *Aquaculture (Principles of Aquaculture)*

Code : ZOO-C-I

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.
4. Determination of dosages of chemicals and drugs for treating common diseases.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample;
Estimation of dissolved oxygen, free carbondioxide, total alkalinity, total Hardness, phosphates and nitrites.
2. Soil analysis – Determination of soil texture, pH, conductivity, available nitrogen, availablephosphorus and organic carbon.
3. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Each 5

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A.P. (AUTONOMOUS)

Practical - VI

w.e.f. 2019–20.

(Principles of Aquaculture) Max. Marks: 25

Model Question Paper (External)

Paper Code: ZOO-C-I

I.Cultivable fishes:

1. Spotters: Identify, draw neat labeled diagram and comment on
A, B, C & D 4X2=8m

II.Diseases:

2. Identification and study of fish and shrimp diseases- Using specimens/ Pictures
A & B 2x2=4m
3. External examination of the diseased fish –diagnostic features and procedure. 3m
4. Determination of dosages of chemicals and drugs for treating common diseases 1x3=3m

III:Pond management:

5. Identification and study of common zooplankton, aquatic insects and aquatic weeds. 2x2=4m
A & B
6. Salinity in the pond water sample. 3m

Total -- 25

Guide lines for the Practical Examiners. w.e.f. 2019–20.

1. Spotters: Identify and comment on A, B, C & D (Charts / Photographs). 4X2=8m
(Identification - $\frac{1}{2}$ mark, neat labeled diagram and Comments - $1\frac{1}{2}$ m)
2. Identify and comment on A & B (Charts / Photographs) 2x2=4m
(Identification - $\frac{1}{2}$ mark & Comments - $1\frac{1}{2}$ m)
3. External examination of the diseased fish –diagnostic features and procedure. 3m
(3 marks for Procedure)
4. Determination of dosages of chemicals and drugs for treating common diseases 1x3= 3m
5. Identification and study of common zooplankton, aquatic insects and aquatic weeds. 2x2=4m
(Identification - $\frac{1}{2}$ mark & Comments - $1\frac{1}{2}$ m)
6. Salinity in the pond water sample. 3m

Practical - VI w.e.f. 2019–20.

(Principles of Aquaculture)

Max. Marks: 25

Model Question Paper (Internal)

Code: ZOO-C-I

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
	Total --	25M

ZOOLOGY PRACTICAL

Credits:2 Periods : 24

Max.Marks:50

Paper Title : Aquaculture (*Aquaculture management*)

Code : ZOO-C-II

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates, lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. ?
4. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

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A.P. (AUTONOMOUS)

Practical - VI

*(Aquaculture management)
Model Question Paper (External)*

*w.e.f. 2019 - 20
Max. Marks: 25
Paper Code: ZOO-C-II*

I. Nutrition:

1. Identification and study of Live food organisms- A & B 2X2=4m
2. Estimation of Proximate composition of aquaculture feeds – A & B 2x2^{1/2}=5m

II. Post harvest Technology:

3. Curd and fermented fish products (Procedure) 5m
4. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. 5m
5. Identification of hazards & Comment on A & B. 2x3=6m

Total-----25m

Guide lines for the Practical Examiners.

w.e.f. 2019 - 20

Max. Marks: 25

1. Identify and comment on A & B (Charts / Photographs).
(Identification - $\frac{1}{2}$ mark and Comments - $1\frac{1}{2}$ m)
2. Estimation of Proximate composition of aquaculture feeds – A & B
(Composition – A- $2\frac{1}{2}$ Composition – B- $2\frac{1}{2}$)
3. Curd and fermented fish products (Procedure)
(5 marks for Procedure)
4. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
(If any one Procedure – 5 marks)
5. Identification of hazards & Comment on A & B
(Identification - 1 mark & Comments- 2m)

Practical - VI w.e.f. 2019–20.

(Aquaculture management)

Max. Marks: 25

Model Question Paper (Internal) Code: ZOO-C-II

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
	Total --	25M

ZOOLOGY PRACTICAL

Credits:2 Periods : 24

Max.Marks:50

Paper Title : Aquaculture (*Post-harvest Technology*) Code : ZOO-C-III (PROJECT)

Project Work

Visit to a fish breeding centre / fish farms and submit a project report

Or

Visit to a feed manufacturing unit and submit a project report

Or

Visit to a shrimp hatchery / shrimp farms and submit a project report

Or

Visit to a shrimp processing unit and submit a project report

A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)

Practical - VI w.e.f. 2019–20.

(Post-harvest Technology) Max. Marks: 25

Model Question Paper (Internal) Code: ZOO-C-III (PROJECT)

1. Attendance	--	5 M
2. Project Record – (Fish form)	--	10M
3. Project Record – (Fish form)	--	10M
Total	--	25M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS
SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-**

(Autonomous)

Accredited by NAAC with "A" Grade

2020-21



DEPARTMENT OF ZOOLOGY

MINUTES OF BOARD OF STUDIES

04-07-2020 (ODD SEMESTER)

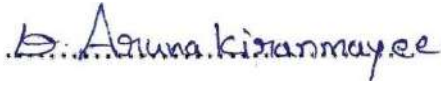
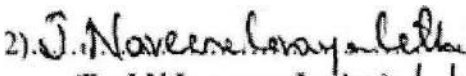
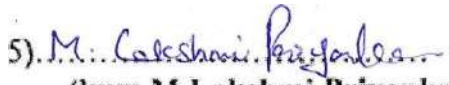
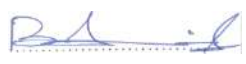
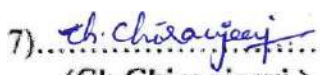


Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 11.00 AM on 04-07-2020 in the Department of Zoology.

Smt.D.A. Kiranmayee Members

Presiding

Presents

- 1)  Chair person
(Smt. D.A.Kiranmayee.) Head, Department of Zoology,
A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2)  University Nominee
(Dr.J.N.Lavanya Latha.) 4/7/2020 Krishna University,
Machilipatnam.
- 3) Academic Council
(Dr.K.Daniel) Nominee Head, Dept.of Zoology,
JKC College, Guntur.
- 4) Academic Council
(B.Elia) Nominee Head, Dept.of Zoology,
Govt.DegreeCollege,
Pitapuram.
- 5)  Member
(kum.M.Lakshmi Priyanka.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 6)  Industrialist
(B.Appala Naidu) Asst. ProjectManager.
RGCA
- 7)  Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi.) Dept.ofBotany& Microbiology,
Acharya Nagarjuna University,
Guntur

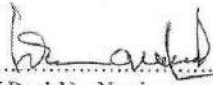
Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 11.00 AM on 04-07-2020 in the Department of Zoology.

Smt.D.A. Kiranmayee. ... Presiding

Members Present:

1) Chair person . Head, Department of Zoology,
A.G&S.G.S Degree College of Vuyyuru-521165.
(Smt. D.A.Kiranmayee.)

2)..... University Nominee Dr. J.N.Lavanya Latha,
(Dr.J.N.Lavanya Latha.)Krishna University,
Machilipatnam.

3).....  Academic Council Head, Department of Zoology,
(Dr. K.Daniel.) Nominee JKC College,
Guntur,

4)..... Academic Council Head, Department of Zoology,
(B.Ella.) Nominee Gov. Degree College,
Pitapuram.

5)..... Member Lecturer in Zoology,
(kum.M.Lakshmi Priyanka.) A.G&S.G.S Degree College
Vuyyuru-521165.

6)..... Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA
Manikonda.

7)..... Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi.) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 11.00 AM on 04-07-2020 in the Department of Zoology.

Smt.D.A. Kiranmayee. Presiding

Members Present:

1) Chair person Head, Department of Zoology,
A.G.&S.G.S Degree College of Vuyyuru-521165.
(Smt. D.A.Kiranmayee.)

2)..... University Nominee Dr. J.N.Lavanya Latha.
(Dr.J.N.Lavanya Latha.)Krishna University, Machilipatnam.

3)..... Academic Council Head, Department of Zoology,
(Dr. K.Daniel.) Nominee JKC College, Guntur.

4)..... Academic Council Head, Department of Zoology,
(Dr. B.Elia.) Nominee Gov. Degree College, Pitapuram.

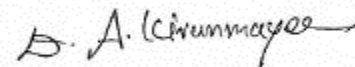
5)..... Member Lecturer in Zoology,
(kum.M.Lakshmi Priyanka.) A.G&S.G.S Degree College Vuyyuru-521165.

6)..... Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA Manikonda.

7)..... Student Represent P.hd –Research scholar,
(Ch.Chiranjeevi) Dept.ofBotany& Microbiology, Acharya Nagarjuna University, Guntur.

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for I Semester of I B.Sc (B.Z.C) for the academic year 2020 - 2021.
2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II B.Sc (B.Z.C) for the academic year 2020 - 2021.
3. To recommend the syllabi (Theory & Practical), Model question paper for V Semester of IIIB.Sc (B.Z.C) for the academic year 2020 - 21
4. To recommend the Blue print for the semester end exam for I, III & V semester of I,II,III B.Sc (B.Z.C) for the academic year 2020 - 21.
5. To recommend the syllabus of Competitive Zoology as Unit VI in I and III semesters.
6. To recommend the syllabus of Certificate Course, Organic Farming to Science and Non-Science students
7. To recommend the teaching and evaluation methods to be followed under Autonomous statutes.
8. Any other matter.



Chairman

RESOLUTIONS

1. It is resolved to implement the revised new syllabus (Theory & Practical), model question paper & guide lines to be followed as prescribed by APSCHE in Zoology I semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS).
2. It is resolved to implement the same syllabi (Theory & Practical), model question paper & guide lines to be followed by the question papers under Choice Based Credit System (CBCS) for Zoology III Semester of II B.Sc. (B.Z.C) approved by the Academic Council of 2020 –21.
3. It is resolved to implement the same syllabi & model papers under Choice Based Credit System (CBCS) Setters of Zoology of V semester of III B.Sc. (B.Z.C) to be approved by the Academic Council of 2020-21.
4. It is resolved to continue the same Blue prints of I, III, & V Semesters of B.Sc Zoology for the Academic year 2020-21.
5. It is resolved to follow the syllabus of Competitive Zoology as Unit- VI in I, III Semesters for the Academic year 2020-2021. Questions from the VI-Unit will be given in IA-1, IA-II but not in semester end exams.
6. It is resolved to conduct Certificate course in Organic Farming to Science and Non- Science Students.
7. It is resolved to continue the following teaching & evaluation methods for the Academic year 2020-21.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

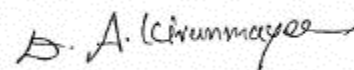
Evaluation of a student is done by the following procedure:

Internal Assessment Examination:

- Out of maximum 100 marks in each paper for I, II, III B.Sc, 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, 20 marks are allocated for announced tests (i.e. IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for I, II, III B.Sc.
- There is no pass minimum for internal assessment for I, II, III B.Sc.

Semester – End Examination:

- The maximum mark for I, II, III B.Sc semester- End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS"
- Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, III, & V semester for I, II & III B.Sc.
- Discussed and recommended for organizing Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.



Chairman

**A.G & S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

ZOOLOGY

Semester – I

Class: I B.Sc .

PAPER-I

w.e.f. 2020-2021

Credits : 3

(Code: Zoo-101C)

Title of the paper: Biology of Non – Chordates.

Max.Marks : 70

60 hrs.(4hrs/week)

UNIT-I

10hrs.

1.1: Whittaker's five kingdom concept and classification of Animal Kingdom.

1.2 General Characters and classification of protozoa up to classes with suitable examples

1.3: **Phylum - Protozoa:** Type study: *Elphidium*

UNIT-III 16 hrs

Phylum Porifera

2.1 General characters and classification up to classes with suitable examples

2.2 Skelton in Sponges, Canal system in sponges

Phylum – Coelenterata

2.3 General characters and classification up to classes with suitable examples

2.4 type study: Obelia – Morphology, Structure of polyp & Medusa

2.5 Polymorphism in coelenterates

2.6 Corals and coral reefs

UNIT-III 10 hrs

Phylum Platyhelminthes

3.1 General characters and classification up to classes with suitable examples

3.2 Life cycle and pathogen city of Fasciola hepatica

3.3 Parasitic Adaptations in helminthes Phylum Nematelminthes

3.4. Life cycle and pathogen city of Ascarislumbricoides

UNIT-IV 15hrs

Phylum Annelida

4.1 General characters and classification up to classes with suitable examples

4.2 Evolution of Coelom and Coelomoducts

4.3 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Phylum Arthropoda

4.4 Vision and respiration in Arthropoda

4.5 Peripatus - Structure and affinities

UNIT- V

Phylum Mollusca 9 hrs

5.1 General characters and classification up to classes with suitable examples

5.2 Pearl formation in Pelecypoda

5.3 Water vascular system in star fish

5.4 Larval forms of Echinodermata

Phylum Hemichordata

5.5 Balanoglossus - Structure and affinities

UNIT- VI – COMPETITIVE ZOOLOGY

6.1: Cells-Cell Definition- Discovery of cells- Characteristics of cells- Types of cells.

6.2: Cell Structure-Cell Organelles and Functions. Cell Theory.

6.3 Defference between Prokaryotic and Eukaryotic Cells

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester – I

(Model question paper)

w.e.f. 2020-2021 **Title of the paper:**

Biology of Non – Chordates. Code – Zoo-101C

Time: 3hrs.

max.marks: 70

.....
Section – A

Answer any **four** questions. Each question carries **five** marks.

Draw neat labeled diagrams wherever necessary.

4 x 5 = 20.

1. Spicules in Sycon.
2. Structure of medusa in Obelia.
3. Life history of Ancylostomoduodenale .
4. Coelomoducts in Annelida .
5. Significance of Vermiculture .
6. Affinities of Peripatus .
7. Structure of Balanoglossus .
8. Bipinnaria Larva.

Section – B

Answer any **five** questions. Each question carries **Ten** marks.

Draw neat labeled diagrams wherever necessary. **5 x 10 = 50.**

9. Elphidium shows alternation of generations in its life cycle – discuss.
10. Write an account of canal system in Porifera.
11. Describe briefly the phenomenon of polymorphism in Coelenterates.
12. Describe the life history of Fasciola hepatica.
13. Describe the excretory system in leech.
14. Explain the respiratory system in prawn.
15. Explain the process of pearl formation in pelecypoda.
16. Describe the Water vascular system in Starfish.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - I

Guide lines to the Paper Setter.

Title of the paper: Biology of Non – Chordates. Code – Zoo-101C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **FOUR** questions out of eight in Section – A. Each question carries **five** marks. $4 \times 5 = 20M$.
2. Answer any **Five** questions out of eight in Section – B. Each question carries **Ten** marks. $5 \times 10 = 50M$.

	Section	UNIT-I (Protozoa)	UNIT-II Porifera- Coelenterata)	UNIT-III platyhelminthes)	UNIT-IV Annelida- Arthropoda)	UNIT-V Mollusca Echinodermata
5 Marks Questions	A	2	2	2	2	2
10 Marks Questions	B	1	2	1	2	2
Weightage		20	30	20	30	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA
Dt.,A.P. (AUTONOMOUS)
ZOOLOGY
PRACTICAL - I

w.e.f. 2020-2021

.Code :Zoo- 101P
(2hrs/week)

MAX.MARKS : 50.

Biology of non-chordates

1.INVERTEBRATES : Observation of the following slides/ specimens / models.

Protozoa –.Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella,
Entamoebahistololytica, Plasmodium vivax

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

Coelenterata - Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatulav

Platyhelminthes -Planaria, Fasciola hepatica, Fasciolalarval forms – Miracidium, Redia, Cercaria,
Echinococcusgranulosus, Taeniasolium, Schistosomahaematobiumvii.

Nemathelminthes - Ascaris(Male & Female), Drancunculus, Ancylostoma, Wuchereria

Annelida -Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva

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. xiii.

Mollusca - Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium

Echinodermata -Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva

.Hemichordata- Balanoglossus, Tornaria larva.

Demonstration of dissection / dissected / Virtual Dissections.

1. Prawn - Digestive system .
2. Prawn - Appendages,
3. Prawn - Nervous system,
4. Mounting of statocyst
6. Insect Mouth Parts.

- Compulsory one species to be adopted for demonstration only by the faculty.**
- Computer Aided Techniques as per U.G.C Guidelines.**
- Laboratory record work shall be submitted at the time of Practical Examination.**

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165

EXTERNAL PRACTICAL- I

w.e.f. 2020-2021.

(Animal Diversity of Invertebrates)

(2hrs/week)

MODEL QUESTION PAPER -ICode: ZOO-101P

Time: 3 hrs.

Max.marks: 25m.

- | | |
|--|---------|
| I. Draw neat labeled diagram of Digestive system Leech. | 6M. |
| II . Draw neat labeled diagram of Radula of Pila. | 4M. |
| III. Spotters: Identify, draw labeled diagram & write notes on
A, B, C, D | 4X3=12M |
| IV. Viva. | 3M |
| TOTAL: ----- | 25M. |

Guide lines for the practical Examiners

- I. **List of dissections** : (8marks for diagram & 2 marks for labeling)

Leech/Prawn/Scorpion/Crab- Digestive system.

Prawn – Appendages.

Prawn / Scorpion /Crab- Nervous system

Pila / Unio – Digestive system.

- II.Mounting of Statocyst / Mounting of Radula. (Mounting 4 marks, labeled diagram 1 marks)

III.Spotters: 1Mark for identification, 1 Mark for labeled diagram & 3Mark for notes for each spotter.

Invertebrates: 4 specimens / slides / models.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165

INTERNAL PRACTICAL- I

w.e.f. 2020-2021.

(2 hrs/week).

(Animal Diversity of Invertebrates)Code: ZOO-101P.

MODEL QUESTION PAPER -I

Max.marks:25M.

Time: 3hrs.

- | | | | |
|----------------------------------|-------|------|------------------|
| 1. Attendance | ----- | 05M. | |
| 2. Record | ----- | 10M. | |
| 3. Field note book. | ----- | 05M | |
| 4. Project (Within the syllabus) | ----- | 05M. | Total ----- 25M. |

Reference Books :-

1. Modern Text Book of Zoology - vertebrates..... R.L.Kotpal

2. A Text Book Zoology EkambarnathAyya

SEMESTER - III

w.e.f. - 2018 – 2019.

Class: II B.Sc (B.Z.C)

Paper Code: ZOO -301C 60 Hrs (4hrs/ week)

Max.Marks: 70

Credits: 3

Title of the Paper : Cytology, Genetics and Evolution.

Unit – I 10 Hrs

1.1 Cytology - I :- Electron microscopic structure of cell .

1.2 Plasma membrane - Fluid mosaic model, Transport functions of plasma membrane (Active & Passive)

Unit – II 15 Hrs

2.1 Cell Organelles :- Structure and functions of Endoplasmic reticulum, Golgi body, Ribosome's, Lysosomes, Mitochondria.

2.2 DNA: Watson & Crick model , Semi Conservative Replication.

2.3 RNA - Structure, types & functions of RNA.

2.4 Chromosomes - Structure, types & functions, Giant Chromosomes (lamp brush & Polytene)

Unit – III 10 Hrs

3.1 Genetics-I:- Mendel's Laws of Inheritance, Incomplete dominance and co-dominance

3.2 Lethal alleles, Epistasis , Linkage and crossing over.

Unit – IV 15 Hrs

4.1 Genetics – II :- Sex determination - Genic balance theory / Bridges theory, Barr bodies.

4.2 Sex linked inheritance.

4.3 Extra chromosomal inheritance (Kappa particles in Paramecium)

4.4 Blood group inheritance.

Unit – V 10 Hrs

5.1. Evolution:- Origin of life,. Hardy -Weinberg Equilibrium, Lamarckism , Darwinism, Neo – Darwinism

5.2 Isolation, Speciation (Allopatric and Sympatric).

Unit – VI (COMPETITIVE ZOOLOGY)

6.1: Anatomy- Types of Anatomy- Classification of Anatomy

6.2: Application of Anatomy, Application of Gross Anatomy.

6.3: Physiology- Human Physiology- Endocrine system-Hormones- Mechanisms of Hormone Action.

6.4: Nervous system- nerve Cells- Organization of Nervous System Structurally.

6.5: White Blood Cells.

A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,

Krishna Dt. A.P. (Autonomous)

Semester - III (Model question paper)

w.e.f.2018-2019

Title of the paper: Cytology, Genetic & Evolution. Code – Zoo-301C

Time: 3hrs.

Max. Marks: 70

Section – A 4 x 5 = 20.

Answer any **Four** questions. Each question carries **Five** marks. Draw neat labeled diagrams wherever necessary.

1. Cytoplasm.
2. Fluid mosaic model.
3. Golgi body.
4. Mitochondria.
5. Crossing Over.
6. Linkage.
7. Barr bodies.
8. Hardy- Weinberg law.

Section – B

5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Describe the ultra structure of Eukaryotic cell?
 10. Give an account of structure and functions of Endoplasmic reticulum.
 11. Describe the structure and functions of plasma membrane.
 12. Explain the structure and types of chromosomes?
 13. Describe the Mendel's laws of Inheritance?
 14. Write an essay on Epistasis.
 15. Explain sex determination with the help of Balance theory.
 16. Write an essay on Isolation?
-

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - III

**Guide lines to the Paper Setter.
Evolution**

**W.e.f. 2020-2021 Title of the paper: Cytology, Genetic &
Code – Zoo-301C**

Time: 3hrs.

Max.marks:70

Max. Marks: 75m.

1. Answer any **FOUR** questions out of eight in Section .A. Each question carries**FIVE** marks. 4x5=20m.

2. Answer any**FIVE** questions out of eight in Section – B. Each question carries **TEN** marks. 5x10= 50M.

	PART	UNIT-I (Cytology I)	UNIT-II (Cell Organelles)	UNIT-III (Genetics-I)	UNIT-IV (Genetics-II)	UNIT-V (Evolution)
5 Marks Questions	A	1	2	1	2	2
10 Marks Questions	B	1	2	1	2	2
Weightage		15	30	15	30	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

Reference Books :-

- 1.A Test Book of zoology: Vikram modern series: E.Chakrapani.
2. Cytology, Genetics &Ecology :P.S.Verma&V.K.Agarwal.
3. Common core –A test Book of Zoology: Sri Vikas Publication : C. Gopal.

ZOOLOGY PRACTICAL SYLLABUS

PAPER – III

Class: II B.Sc

60 Hours/Week : 2

Credits: 2

Paper Title: Cytology, Genetics & Evolution.

Code : ZOO -301P C

Max.Marks:50

I. Cytology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chironomous*

II. Genetics

1. Study of Mendelian inheritance using suitable examples
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin's finches (pictures)
5. Visit to natural history museum and submission of report

**A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU 521165, KRISHNA
Dt., A.P. (AUTONOMOUS)
PAPER – III
(Cytology, Genetics & Evolution)**

Model Question paper (External) Max.Marks: 25 M.

Paper Code: ZOO-301C

I. Cytology

1. Identify, draw neat labeled diagram & notes of the following stages. 2x2 ½= 5M.
A & B

II. Genetics

1. Genetics Problem. 5M.
2. Identify the following Chromosomes & Comment. 2x2 ½= 5M.
A & B

III. Evolution

1. Identify the given pictures and write the Comment. 2x2 ½= 5M
A & B
2. Identify the given pictures and Comment. 2x2 ½= 5M
A & B

**A. G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165
ZOOLOGY PRACTICAL -III
(INTERNAL)**

(2hrs/week).

(Cytology, Genetics & Evolution)

Code: ZOO-301P.

Max.marks:25M.

Time: 3hrs.

- 1. Attendance ----- 5M.
- 2. Record ----- 10M.
- 3. Field trip & Field note book -----10M.

Total ----- 25M.

**A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)
PAPER – III**

Guide lines for the practical Examiner

Class: II B.Z.C

Paper Title: (Cytology, Genetics & Evolution)

Max.Marks: 25 M.

w.e.f.2020-21.

Paper Code: ZOO-301C

.....

I.Cytology

1. Slide A from Mitosis & Slide B Meiosis. $2 \times 2 \frac{1}{2} = 5M$.
($\frac{1}{2}$ mark for identification, 1 mark for labeled diagram & 1 mark for comments)

II.Genetics

2. Checker board 2M.
Explanation 3M.
3. Identify & Comment on A& B (From Chromosomes). $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2}$ M
B-Identification – 1 M, Comment – $1 \frac{1}{2}$ M

III.Evolution

4. Identify & Comment on A&B(A- fossil evidence, B – Homology & Analogy) $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2}$ M
B-Identification – 1 M, Comment – $1 \frac{1}{2}$ M
5. Identify & Comment on A& B (A- Phylogeny of Horse, B – Darwin's Finches) $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2}$ M
B-Identification – 1 M, Comment – $1 \frac{1}{2}$ M

(Zoology paper-V)

Class: III B.Sc (B.Z.C)

w.e.f.- 2017-2018.

Paper Code : ZOO -501C

60 Hrs. (4hrs/week) Max.Marks: 70

Title of the Paper : **Animal Biotechnology.**

Unit 1:Tools of Recombinant DNA technology - Enzymes and Vectors 15 Hrs.

- 1.1.Restriction modification systems : Types I, II and III- Nomenclature, Applications of Type II restriction enzymes in genetic engineering ,DNA polymerases, transferase, kinases and phosphatases,and DNA ligases
- 1.2 Cloning Vectors: : Properties of Cloning Vectors Plasmid vectors:pBR and pUC 18, Bacteriophage and, Cosmids.Artificial Chromosome Vectors: BACs, YACs,

Unit 2: Techniques of Recombinant DNA technology 15 Hrs

- 2.1 Cloning: Procedure of gene cloning, Use of linkers and adaptors.Microinjection, electroporation, biolisticmethod (gene gun). PCR:- Basics of PCR,Principle and Procedure of PCR.
- 2.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing.
- 2.3 Southern, Northern and Western blotting. DNA finger printing,

UNIT 3 Animal Cell Technology 10 Hrs.

- 3.1 Cell culture media: Natural and Synthetic, Types Cell cultures-: primary culture, secondary culture. Continuous cell lines , Established Cell lines (common examples such as MRC, HeLa,CHO, BHK,)
- 3.2 Cryopreservation of cultures, Hybridoma Technology:- Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb
- 3.3.Stem cells: Types of stem cells- Embryonic and Adult Stem Cells, Diabetes and Parkinson's diseases.

Unit 4: Reproductive Technologies & Transgenic Animals 10 Hrs

- 4.1 Manipulation of reproduction in animals, Artificial Insemination, *In vitro* fertilization.
- 4.2 Super ovulation, Embryo transfer, Embryo cloning.
- 4.3 Transgenic Animals- Production of Transgenic Animals- sheep,fish.

Unit 5: Applied Biotechnology 10 Hrs.

- 5.1Industry: Fermentation- Different types of Fermentation. Submerged & Solid state, batch, Fed batch & Continuous (Short notes only)
- 5.2 Downstream processing - Filtration, centrifugation, chromatography, spray drying ,
- 5.3Fisheries : Polyploidy in fishes

SEMESTER-V (Model Question paper)

w.e.f.- 2017-201

Time : 3 hrs

Paper Title: Animal Biotechnology.

Paper Code : 501C

Max.Marks:70

Part – A

Answer **any FOUR** questions out of eight in Part - A . Each question carries five marks. **4 X 5 = 25**

Part – B

- 1.Ligases
- 2.YAC
- 3.Southern Blotting
- 4.DNA Fingerprinting
- 5.Applications of mAb
- 6.Polyploidy in fishes
- 7.Invivo fertilization
- 8.Chromatography

Part – B

Answer **any FIVE** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on cloning vectors.
10. Explain the role of Type II Restriction enzymes in genetic engineering.
11. Define gene cloning .Describe the procedure of gene cloning in detail.
12. What is PCR. Briefly describe various steps of PCR.
13. Define Stem Cell Technology ? Briefly describe about it.
14. Write in detail about the transgenic animals.
15. Write an essay on different types of fermentation.
16. Briefly describe the technology of super ovulation and Embryo transfer in cattle's and discuss their applications and limitations.

SEMESTER-V

Time :3 hrs

Max.Marks:70

Guide lines to the paper setter

Paper Title : Animal Biotechnology

Paper Code : 501C

Note : 1. Answer **any FOUR** questions out of eight in Part-A . Each question carries five marks. $4 \times 5 = 20M$.

2. Answer **anyFIVE** questions out of eight in Part-B . Each question carries 10 marks. $5 \times 10 = 50M$.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	25	20

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

Reference Books :-

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing , Oxford,U.K
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. ElsevierAcademic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

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A.P. (AUTONOMOUS)

ZOOLOGY PRACTICAL SYLLABUS

PAPER - V

Periods : 30 Code: ZOO-501P
Credits : 2 Paper Title : Animal Biotechnology
Max. Marks: 50

1. Genomic DNA isolation from *E. coli*.
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*.
3. Study the following techniques through photographs.
 - a. Southern blotting.
 - b. Western blotting.
 - c. DNA sequencing (Sanger's method)
 - d. DNA finger printing
4. PCR (demonstration) on site or of site demonstration.
5. Project report on animal cell culture.

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(AUTONOMOUS)

Practical - V
Animal Biotechnology
Model Question Paper (External)
Max. Marks : 25
Paper Code : ZOO-501P

-
1. Identify the following Genomic DNA isolation from *E. coli*. 5m
 2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* . 5m
 3. Study the following techniques given on photographs & Write notes on. 2x5=10
A & B
 4. PCR (demonstration) on site or of site demonstration. 5m

Total: 25m

Guide lines for the Practical Examiners.

Class: III B.Z.C
Paper Title: Animal Biotechnology.
Max.Marks: 25 M.

w.e.f.2017-18

Paper Code: ZOO-501C

1. Identify the following Genomic DNA isolation from *E. coli*.
(5 marks for Procedure)
2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* .
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. PCR (demonstration) on site or of site demonstration.
(5 marks for PCR demonstration)

Practical – V

Animal Biotechnology

Max. Marks : 25

Model Question Paper (Internal)

Paper Code : ZOO-501P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book	--	10M
Total	--	25M

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(AUTONOMOUS)**

SEMESTER - V

(Zoology paper-VI)

Class: III B.Sc (B.Z.C)

w.e.f.-2017 -18

Paper Code : ZOO -502C

60 Hrs(6hrs/ week) External : 70Credits :3

Title of the Paper :**Animal Husbandry.**

UNIT – I :10 Hours

- 1.1 General introduction to poultry farming, Principles of poultry housing. Poultry houses.
- 1.2 Systems of poultry farming.
- 1.3 Management of chicks, growers, layers, and Broilers.

UNIT – II:

10 Hours

- 2.1. Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers.
- 2.2. Methods of feeding- Whole grain feeding system, Grain and mash method, All mash method, Pellet feeding.
- 2.3. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III:

10 Hours

- 3.1 Selection, care and handling of hatching eggs, Egg testing.
- 3.2 Methods of hatching.
- 3.3 Brooding and rearing, Sexing of chicks.

UNIT- IV:

20 Hours

- 4.1 Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds.
- 4.2 Systems of inbreeding and crossbreeding.
- 4.3 Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn

UNIT - V:

10 Hours

- 5.1 Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.
- 5.2 Cleaning and sanitation of programme. Records to be maintained in a dairy farm.

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SEMESTER-V (Model Question paper)

Time : 3 hrs Paper Code : Zoo-502C

Paper Title : Animal Husbandry

Max.Marks:70

Part – A

Answer **any FOUR** questions out of eight in Part - A . Each question carries five marks. **4 X 5 = 25**

1. Principles of poultry farming.
2. Chick management.
3. Poultry feed management .
4. Marek's disease.
5. Egg testing (Candle test)
6. Cleaning and sanitation of Dairy farm.
7. Milk record register
8. Loose housing system

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on systems of poultry farming
10. Write an essay on management of Broilers
11. Write an essay on symptoms control and management of two viral and bacterial diseases.
12. Write an essay on methods of feeding in Poultry
13. Write an essay on different methods of hatching eggs
14. Give an account of breeds of Indian Cows
15. Explain the vaccination programme in Cattle
16. write an essay on care and management of Calf, heifer and milk animals

**A.G & S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

SEMESTER-V

Time :3 hrs

Max.Marks:70

Guide lines to the paper setter

Paper Title : Animal Husbandry.

Paper Code : 502C

Note : 1. Answer **any FOUR** questions out of eight in Part-A . Each question carries five marks.4 X 5 = 25M.

2. Answer **any five** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	2	1
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	30	15

- Note:**
1. Please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

Text Books :-

1. Animal Husbandry: ---- Technical Test paper.
2. Poultry- Technical Revised Common Core .
3. Animal Husbandry --- Dr.K.Kondaiah, A.V.N.Gupta.

ZOOLOGY PRACTICAL SYLLABUS

Period : 30

PAPER – VICredits :2

Paper Title :

Animal Husbandry Paper Code : Zoo-502P

Max.Marks:50

-
1. Study of various breeds of layers and broilers (photographs)
 2. Identification of disease causing organisms in poultry birds (as per theory)
 3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
 4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
 5. Study of various breeds of cattle (photographs/microfilms)
 6. Study of various activities carried out in a dairy farm and submission of a report.

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Practical - VI

Animal Husbandry Max. Marks : 50

Model Question Paper (External)

Paper Code : ZOO-502P

- | | |
|--|-------------------------------------|
| 1. Study of various breeds of layers and broilers (photographs)
A & B | 2X2 ¹ / ₂ =5M |
| 2. Identification of disease causing organisms in poultry birds (as per theory)
A & B | 2X2 ¹ / ₂ =5M |
| 3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration) | 5M |
| 4. Study of various breeds of cattle (photographs/microfilms)
A & B | 2X5=10M |

Total -- 25M

Guide lines for the Practical Examiners.Max.Marks: 25m

Class: III B.Z.C

Paper Code : ZOO-502C

Paper Title: (Animal Husbandry)

1. Identify and comment on A & B (Charts / Photographs).
(Identification - $\frac{1}{2}$ mark & Comments -2m)
2. Identify and comment on A & B (Charts / Photographs)
(Identification - $\frac{1}{2}$ mark & Comments -2m)
3. Demonstration : (4 marks for diagram & 1 marks for labeling)
4. Identify and comment on A & B (Photographs/ microfilms).
(Identification -1 mark & Comments -4m)

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Practical - V
(*Animal Husbandry*) *Max. Marks : 50*

Model Question Paper (Internal) Paper Code : ZOO-502P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book (Any one)	--	10M

Total -- 25M

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(Autonomous)
Accredited by NAA C with “A” Grade

2020-21



DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES
29-03-2021 (EVEN SEMESTER)

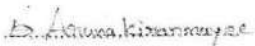
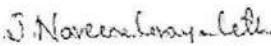


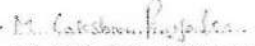
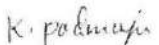

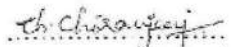


Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru held at 3.00 PM on 29-03-2021 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

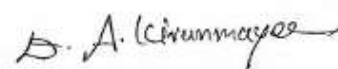
Presiding

Members Present:

- 1) 
(Smt. D.A.Kiranmayee) **Chairperson** Head, Dept.of Zoology,
AG & SG S Degree College, Vuyyuru.
- 2) 
(Dr.J.N.Lavanya Latha) **University Nominee** Professor, Dept. of Bio-Tech.,
Krishna University,
Machilipatnam.
- 3) 
(Dr. K.Daniel) **Academic Council
Nominee** Head, Dept.of Zoology,
JKC College, Guntur.
- 4) 
(Dr.B. Elia) **Academic Council
Nominee** Head, Dept.of Zoology,
Govt. Degree College,
Pitapuram.
- 5) 
(Ms.M.Lakshmi Priyanka) **Member** Lecturer, Dept.of Zoology,
AG & SG S Degree College, Vuyyuru.
- 6) 
(Smt. K.Padmaja) **Member** Lecturer, Dept.of Zoology,
AG & SG S Degree College, Vuyyuru.
- 7) 
(B.Appala Naidu) **Industrialist** Asst. Project Manager,
RGCA, Manikonda.
- 8) 
(Ch.Chiranjeevi) **Student Represent** Ph.D, Research Scholar,
Dept.of Botany & Microbiology,
Acharya Nagarjuna University, Guntur

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper & Guide lines for Semester II of I B.Sc (BZC) in the academic year 2020-21.
2. To recommend the syllabi (Theory & Practical), Model question paper & Guide lines to the Paper setter for IV Semester of II B.Sc (BZC) for the academic year 2020-21.
3. To recommend the syllabi (Theory & Practical), Model question paper & Guide lines to the Paper setter for VI Semester of III B.Sc (BZC) for the academic year 2020-21.
4. To discuss to the syllabus of Elective & Clusters in VI semester for the academic year 2020-21.
5. To recommend the syllabi of Competitive Zoology as Unit- VI in II, IV Semesters for the Academic year 2020-2021.
6. To recommend the teaching and evaluation methods to be followed under Autonomous statues.
- 7 To recommend a Certificate course – Organic farming for II year students in this academic year of 2020-2021.
8. Any other matter.



Chairman

RESOLUTIONS

1. It is resolved to implement the new syllabi (Theory & Practical) as prescribed by APSCHE for Zoology II semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS).

2. It is resolved to implement the changed syllabi in Zoology of IV Semester of II B.Sc. (B.Z.C) according to the suggestions of BOS members. In IV-unit water, Oxygen and CO₂ are added in Abiotic factors of Ecosystem. In the V unit Competition and Predation are added. The model question paper & guide lines to be followed by the question paper setters are approved.

3. It is resolved to follow the same syllabi & model papers under Choice Based Credit System (CBCS) of Zoology of VI semester of III B.Sc. (B.Z.C) approved by the Academic Council of 2020 -21.

4. It is resolved to follow Elective-A (Immunology) and Cluster –B (Aquaculture) in VI Semester from the Academic year 2020-21.

5. It is resolved to continue the same Blue prints of II, IV & VI Semesters of B.Sc Zoology for the Academic year 2020-21

6. It is resolved to follow the syllabus of Competitive Aquaculture as Unit- VI in II, IV Semesters for the Academic year 2020-2021. Questions from the VI-Unit will be given in IA-1, IA-II but not in semester end exams.

7. It is resolved to implement certificate course in Organic Farming for II Year students.

8 It is resolved to continue the following teaching & evaluation methods for the Academic year 2019-20.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

Evaluation of a student is done by the following procedure:

- There are two components in the Valuation and Assessment of a student – Internal Assessment (IA) and Semester Examinations (SE).

(For the Batch of Students Admitted from 2019-2020– UG)

Internal Assessment (IA)

- The maximum mark for IA is 30 and SE is 70 for theory; and for practical papers 50.
- Each IA written examination is of 1^{1/2} hour's duration for 20 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks.
- Other Innovative Components will be for 5 Marks. The innovative component is for 5 marks, conducted during the class hours by the staff member/ in charge of the subject, in the form of assignments/ quiz/ seminars /ppt/ Open Book/Viva Voce/ Group work/ Mini Project/ Exhibition, etc. The topic and time for submission/ presentation will be announced by the staff member/ in charge of the subject in advance. Each student should explain and defend his/her presentation. For attendance 5 Marks are allotted.
- The semester examination will be of 3 hours with maximum 70 marks.
- There is no passing minimum for IA.

Semester Examinations (SE)

- A student should register himself/herself to appear for the Semester Examinations by payment of the prescribed fee.
- The Semester Examinations will be in the form of a comprehensive examination covering the entire syllabus in each subject. It will be of 3 hours duration & Foundation course 2 hours irrespective of the number of credits allotted to it.
- If a candidate fails to obtain pass marks even after the due to less mark in the IA examination, the marks of the next examination will be converted to be out of 100.
- Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/she gets 40/70) and the result shall be declared as 'PASS'
- The maximum marks for each Paper shall be 100.

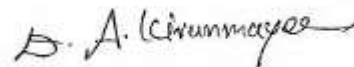
Evaluation of a student is done by the following procedure:

➤ **Internal Assessment Examinations:**

- The maximum mark for IA is 30 and SE is 70 for theory; and for practical papers 50.
- Each IA written examination is of 1^{1/2} hour's duration for 20 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks.
- Other Innovative Components will be for 5 Marks. The innovative component is for 5 marks, conducted during the class hours by the staff member/ in charge of the subject, in the form of assignments/ quiz/ seminars /ppt/ Open Book/Viva Voce/ Group work/ Mini Project/ Exhibition, etc. The topic and time for submission/ presentation will be announced by the staff member/ in charge of the subject in advance. Each student should explain and defend his/her presentation. For attendance 5 Marks are allotted.
- The semester examination will be of 3 hours with maximum 70 marks.
- There is no passing minimum for IA.

II. Semester-End Examinations:

- The maximum marks for II B.Sc Semester-End examination shall be 70 marks and duration of the examination shall be 3 Hours.
- The maximum marks for IV B.Sc Semester-End examinations shall be 70 marks and duration of the examination shall be 3 Hours.
- The maximum marks for III B.Sc Semester-End examinations shall be 70 marks and duration of the examination shall be 3 Hours.
- Semester-End examinations shall be conducted in theory papers at the end of every semester while in practical papers, these examinations are conducted at end of II, IV & VI semesters.
- Discussed and recommended for organizing Seminars, Guest lectures, Work-shops to upgrade the knowledge of students, for the approval of the Academic Council.



Chairman.

ZOOLOGY
SEMESTER -II

Class: I B.Scw.e.f. - 2020 - 21

No. of Hours per week: 4

Title of the Paper: -**Animal Diversity – Biology of Chordates** Code: ZOO -201 C

Credits: 3 Max.Marks: 70

UNIT – I 15hrs

- 1.1 General characters and classification of Chordata up to classes
- 1.2 Protochordata- Salient features of Cephalochordata, Affinities of Cephalochordata.
- 1.3 Salient features of Urochordata
- 1.4 Structure and life history of *Herdmania*
- 1.5 Retrogressive metamorphosis – Process and Significance

UNIT – II 15hrs

- 2.1 Cyclostomata, General characters, Comparison of *Petromyzon* and *Myxine*
- 2.2 Pisces: General characters of Fishes
- 2.3 *Scoliodon*: External features, Digestive system, Respiratory system, Structure and function of Heart, Structure and functions of the Brain.
- 2.4 Migration in Fishes
- 2.5 Types of Scales
- 2.6 Dipnoi

UNIT – III

10 hrs

- 3.1 General characters of Amphibia
- 3.2 Classification of Amphibia up to orders with examples.
- 3.3 *Rana hexadactyla*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and functions of the Brain
- 3.4 Reptilia: General characters of Reptilia, Classification of Reptilia up to orders with examples
- 3.5 *Calotes*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
- 3.6 Identification of Poisonous snakes and Skull in reptiles

UNIT – IV

12 hrs

- 4.1 Aves General characters of Aves
- 4.2 *Columbalivia*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
- 4.3 Migration in Birds
- 4.4 Flight adaptation in birds

UNIT – V

8 hrs

- 5.1 General characters of Mammalia
- 5.2 Classification of Mammalia up to sub - classes with examples
- 5.3 Comparison of Prototherians, Metatherians and Eutherians
- 5.4 Dentition in mammals

UNIT – VI – COMPETITIVE ZOOLOGY

- 6.1. **Basic Food Substances.**
- 6.2. **Glossary Biology**
- 6.3 **Zoology Evolution Facts.**

Title of the paper: Animal Diversity – Biology of Chordates

Code – Zoo-201C

Max. Marks: 70.

Time: 3hrs.

Section – A 4 x 5 = 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

1. Structure of Branchiostoma
2. Migration in Fishes.
3. Arterial system in Scoliodon.
4. Parental care in Amphibians.
5. Structure of heart in Calotes.
6. Types of feathers in Birds.
7. Flight adaptations in Birds

8. Prototheria.

Section – B 5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. What is Retrogressive Meta morphosis? Describe this process in life history of Herdmania?
10. Differentiate between Petromyzon and Myxine?
11. Give an account of Dipnoi fishes.
12. Describe the structure and working of heart in Rana?
13. Give an account of brain of Calotes?
14. Write an essay on migration in birds?
15. Explain the respiratory system of Columba livia?
16. Write an essay on Dentition in mammals?

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru– 521165, Krishna
Dt. A.P. (Autonomous)**

Semester -II

Guide lines to the Paper Setter.

Title of the paper: Animal Diversity – Biology of Chordates **Max. Marks: 70**

Time: 3hrsCode – Zoo-201C

1. Answer any **FOUR** questions out of eight in Section – A. Each question carries **fIVE** marks.4x5 = 20M

2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10= 50M

	Section	UNIT-I prochordata	UNIT-II (Cyclostomata &Pisces)	UNIT-III (Amphibia & Reptilia)	UNIT-IV (Aves)	UNIT-V (Mammalia)
5 Marks Questions	A	2	1	2	1	2
10 Marks Questions	B	1	2	2	2	1
Weightage		20	25	30	25	20

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

A. G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165,
KRISHNA Dt., A.P. (AUTONOMOUS)

ZOOLOGY
PRACTICAL - II

w.e.f. 2020- 2021

I B.Sc

Code : ZOO - 201P

Hours / Week: 2

Max. Marks: 50

Credits: 2

External : 25

PAPER TITLE: ANIMAL DIVERSITY-BIOLOGY OF CHORDATES

Observation of the following slides / specimens / models:

Protochordata: Herdmania, Amphioxus, Amphioxus T.S. through pharynx.

Cyclostomata : Petromyzon, Myxine

Pisces :Pristis, Torpedo, Hippocoampus ,Exocoetus, Echeneis, Labeo, Catl
Clarius,Channa,Anguilla.

Amphibia :*Ichthyophis, Amblystoma, Axolotl larva, Hyla*

Reptilia : Draco, Chamaeleon, Uromastix,, Testudo, Trionyx, Russelsviper, Naja,
Krait, Hydrophis, Crocodile.

Aves :: *Psittacula, Eudynamis, Bubo, Alcedo.*

Mammalia : *Ornithorhynchus, Pteropus, Funambulus*

Dissections-

1. *Scoliodon* IX and X, Cranial nerves
2. *Scoliodon* Brain
3. Mounting of fish scales

Note: 1. Dissections are to be demonstrated only by the faculty or virtual.

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

REFERENCE BOOKS:

1. S.S.Lal, Practical Zoology –Vertebrata
2. P.S.Verma, A manual of Practical Zoology – Chordata

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165
EXTERNAL PRACTICAL- II
w.e.f. 2020-2021.

(Animal Diversity-Biology of Chordates)
MODEL QUESTION PAPER -II

(2 hrs/week)
Code: ZOO-201P

Credits: 2.
Time: 3 hrs.

Max.marks: 25m.

-
- | | |
|--|---------|
| 1. Draw neat labeled diagram of IX & X Cranial nerves of Shark. | 7M |
| 2. Spotters: Identify, draw labeled diagram & write notes on
A, B, C, D & E | 5X3=15M |
| 3. Viva. | 3M |
| TOTAL: | 25M. |

Guide lines for the practical Examiners

I. List of dissections :(5marks for diagram & 2 marks for labeling)

1. V, VII, IX, X Cranial nerves of shark/ locally available fishes.
2. Mounting of fishscales

II. Spotters: 1Mark for identification, 1 Mark for labeled diagram & 1 Mark for notes for each spotter.
Chordate: 4 Specimens / Slides / Models
(Prochordates, Fishes, Amphibians, Reptiles, Birds&Mammals)

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165
INTERNAL PRACTICAL- II

w.e.f. 2020-2021.
(2hrs/week).

(Animal Diversity of vertebrates)Code: ZOO-201P.

MODEL QUESTION PAPER -II

Max.marks:25M.

Time: 3hrs.

- | | | |
|-----------------------------------|-------|------|
| 1. Attendance | ----- | 5M. |
| 2. Record | ----- | 10M. |
| 3. Project (Earn while you learn) | ----- | 10M. |

Total ----- 25M.

ADUSUMILLI GOPALKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU- 521165, KRISHNA Dt., A.P. (AUTONOMOUS)

SEMESTER - IV

w.e.f. - 2020 - 21

Class: II B.Sc (B.Z.C) Paper Code : ZOO -401C

Credits: 4

Max.Marks: 70

60 hrs. (4 hrs / week)

Title of the Paper: Embryology, Physiology and Ecology.

UNIT-I

- 1.1 Developmental biology and embryology
 - 1.1.1 Gametogenesis (Spermatogenesis, Oogenesis in mammals)
 - 1.1.2 Fertilization
 - 1.1.3 Types of eggs
 - 1.1.4 Types of cleavage
- 1.2 Formation and function of fetal membrane in chick embryo
- 1.3 Development, types of placenta in mammals

UNIT-II

- 2.1 Physiology-I
 - 2.1.1 Elementary study of process of digestion
 - 2.1.2 Absorption of digested food
 - 2.1.3 Structure of mammalian Lung & mechanism of respiration, transport of oxygen and carbon dioxide
 - 2.1.4 Circulation-structure and function of heart and cardiac cycle
 - 2.1.5 Excretion-structure of nephron, urine formation, counter current mechanism

UNIT-III

- 3.1 Physiology-II
 - 3.1.1 Structure & functional properties of Nerve Cell; Production & propagation of nerve Impulse. Synaptic transmission.
 - 3.1.2 Muscle contraction – ultra structure of muscle fiber, molecular and chemical basis of muscle contraction
 - 3.2.3 Endocrine glands – structure, secretions and the functions (of hormones) of pituitary gland, thyroid, parathyroid, adrenal gland and pancreas
 - 3.1.4 Hormonal control of reproduction in mammals

Unit IV

- 4.1 Ecology-I
 - 4.1.1 Important abiotic factors of ecosystem – temperature, light, water, oxygen and CO₂
 - 4.1.2 Nutrient cycles- Nitrogen, Carbon and Phosphorous
 - 4.1.3 Components of ecosystem (example: lake), food chains and food web, energy flow in ecosystem.

UNIT-V

- 5.1 Ecology-II
 - 5.1.1 Community interactions- mutualism, commensalism, parasitism, competition, predation.
 - 5.1.2 Ecological succession
- 5.2 Zoogeography
 - 5.2.1 Study of physical faunal peculiarities of Oriental, Australian and Ethiopian regions.

UNIT – VI – COMPETITIVE ZOOLOGY

6.1 Zoology Cell Cycles.

6.2 Zoology Time Scale Archaeopterys.

6.3 Zoology Time Scale Mammals

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Krishna Dt. A.P. (Autonomous)**

Model question paper Semester- IV

Title of the paper: Embryology, Physiology and Ecology. Code – Zoo-401C

Time: 3hrs.

Max. Marks: 70.

Section – A4 x 5 = 20M.

Answer any **four** questions. Each question carries **Five** marks. Draw neat labeled diagrams wherever necessary.

1. Types of eggs.
2. Foetal membranes.
3. Counter current mechanism.
4. Synaptic transmission.
5. Pancreas.
6. Energy flow in Ecosystem.
7. Mutualism.
8. Parasitism.

Section – B5 x 10 =50M.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Describe the process of Fertilization.
10. Write an essay on placenta.
11. Explain the mechanism of transport of oxygen and Carbon –dioxide in blood of mammals.
12. Describe the structure and working of mammalian heart.
13. Explain the structure and functions of pituitary gland.
14. Describe the Carbon and Nitrogen cycle.
15. Describe the process of Ecological succession in a pond.
16. Give an account of the fauna of oriental region.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester - IV

Zoology

Guide lines to the Paper Setter.

Title of the paper: Embryology, Physiology and Ecology. Code – Zoo-401C

Time: 3hrs.

Max. Marks: 70m.

- --
1. Answer any **four** questions out of eight in Section .A. Each question carries five marks. 4x5=20m.
2. Answer any **five** questions out of eight in Section – B. Each question carries **Ten** marks. 5x10= 50M.

	PART	UNIT-I (Embryology)	UNIT-II (Physiology-I)	UNIT-III (Physiology)	UNIT-IV (Ecology-I)	UNIT-V (EcologyII,Zoogeography)
5 Marks Questions	A	2	1	2	1	2
10 Marks Questions	B	2	2	1	1	2
Weightage		30	25	20	15	30

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

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KRISHNA Dt., A.P. (AUTONOMOUS)

ZOOLOGY PRACTICAL SYLLABUS
SEMESTER - IV
PAPER – IV w.e.f : 2020 - 21

Periods: 24Max. Marks: 50

Paper Title: Embryology,Physiology & Ecology Paper Code: 401P

I. Embryology

1. Study of T.S. of testis, ovary of a mammal.
- 2 Study of different stages of cleavages (2, 4, 8 cell stages).
- 3 Study of chick embryo of 18 hours, 24 hours, 33 hours and 48 hours of incubation.

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats.
2. Qualitative tests for identification of ammonia, urea and uric acid.
3. Study of activity of salivary amylase under optimum conditions.
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage.

III. Ecology

1. Determination of pH of given sample.
2. Estimation of dissolved oxygen of given sample.
3. Estimation of total alkalinity of given sample.
4. Estimation of salinity of given sample.

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(AUTONOMOUS)
PAPER – IV

(Embryology, Physiology & Ecology)

Model question paper (External)

w.e.f.2020-21.

Max.Marks: 25 M.

Paper Code: ZOO-401C

I. Embryology:

1. Identify, draw neat labeled diagram & comment on . 1½ x 2 = 3M.

A & B

II. Physiology

2. Identify, draw neat labeled diagram & comment on . 1½ x 2 = 3M.

A & B

3. Identify the organic substances in the given samples A & B, each with two tests. 4x 1½ = 6M.

(Sample A- 2X2 ½ =5 Marks & sample B -- 2X2 ½ =5 Marks)

4. Identify the Excretory products in the given samples A & B, each with two tests. 4x 1½ = 6M.

(Sample A- 2X2 ½ =5 Marks & sample B -- 2X2 ½ =5 Marks)

III. Ecology:

5. Determine the P^H of given sample. 1x2=2M.

6. Estimate the dissolved oxygen in the given sample. 1x5=5M.

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165
ZOOLOGY PRACTICAL -IV
(INTERNAL)

(Embryology, Physiology & Ecology) w.e.f. 2020-2021.

(2hrs/week).
Code: ZOO-401P.

Max.marks:25M

Time: 3hrs.

- | | | |
|---------------|-------|------|
| 1. Attendance | ----- | 5M. |
| 2. Record | ----- | 10M. |
| 3. Assignment | ----- | 10M. |

Total ----- 25M.

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU- 521165, KRISHNA Dt., A.P. (AUTONOMOUS)
SEMESTER - VI
ZOOLOGY –ELECTIVE PAPER: VII-(A)**

Class: III B.Sc (BZC)
60 hrs.
Credits: 3
Title of the paper: Immunology

w.e.f – 2017-2018
Paper code: ZOO -601 GE
External: 70

Objective of the course: To facilitate students to understand the role of immune system in the body, cells and organs of immune system, their structures and functioning.

Course out comes:

- Students grow in understanding of immune system, to improve their immunity and to protect them from pathogens.
- They identify their blood groups, their compatibility and the need to donate blood to save life.
- Students identify the classes, structures and functions of antibodies, antigen –antibody reactions.
- This study enables students to take care of themselves and take timely precautions against various diseases.
- They identify the cure of different diseases through various vaccines, the instruments involved in identification of immune reactions etc.

Unit I:

1.1 Overview of Immune system

- 1.1.1 Introduction to basic concepts in Immunology.
- 1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system

- 1.2.1 Cells of immune system
- 1.2.2 Organs of immune system

Unit II:

2.1 Antigens

- 2.1.1 Basic properties of antigens
- 2.1.2 B and T cell epitopes, haptens and adjuvants
- 2.1.3 Factors influencing immunogenicity

Unit - III :

3.1 Antibodies

- 3.1.1 Structure of an antibody
- 3.1.2 Classes and functions of antibodies
- 3.1.3 Antigen and antibody interactions.
- 3.1.4 Monoclonal antibodies and their production.

Unit - IV

4.1 Working of an Immune system

- 4.1.1 Structure and functions of major histocompatibility complexes
- 4.1.2 Exogenous and Endogenous pathways of antigen presentation and processing
- 4.1.3 Basic properties and functions of mediator molecules. (cytokines, interferons and complement proteins).
- 4.1.4 Mechanisms of humoral and cell mediated immunities

Unit - IV

5.1 Immune system in health and disease

- 5.1.1 Classification and brief description of various types of hyper sensitivities
- 5.1.2 Introduction to concepts of autoimmunity and immunodeficiency

5.2 Vaccines

- 5.2.1 General introduction to vaccines
- 5.2.2 Types of vaccines

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KRISHNA Dt.,A.P. (AUTONOMOUS)
SEMESTER-VI (Model Question paper)**

Paper Title: Immunology
Time: 3 hrs

Paper Code:ZOO-601GE

Max.Marks:70

SECTION-A

Answer **any four** questions out of eight in Part - A. Each question carries five marks. **4 X 5 = 20**

1. Active immunity
2. Monoclonal antibodies.
3. TCell Epitope
4. Structure of antibody.
5. Functions of major histo compatibility complexes (MHC)
6. Humoral immunity.
 7. Causes of autoimmune diseases.
 - 8 .BCGVaccine.

SECTION – B

Answer **any five** questions out of eight in Part – B. Each question carries ten marks. **5 X 10 = 50**

9. Give an account of innate immunity.
10. Write an essay on primary lymphoid organs.
11. Discuss about the basic properties of Antigen.
12. Write an essay on immunogenicity.
13. Describe about different types of immunoglobulins.
14. Give an account of basic properties and functions of Cytokines.
15. Define Hypersensitivity. Explain it in detail.
16. Explain different types of vaccines.

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(AUTONOMOUS)**

**SEMESTER-VI
ZOOLOGY ELECTIVE PAPER-VII (A)**

Guide lines to the paper setter

Paper Title: Immunology. Paper Code: ZOO-601GE

Time: 3 hrs Max.Marks:70

Note: 1. Answer **any four** questions out of eight in Part-A. Each question carries five marks.4 X 5= 20M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks. 5 X 10= 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	1	1	2	2	2
10 Marks Questions	B	2	2	1	1	2
Weightage		25	25	20	20	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

ZOOLOGY PRACTICAL SYLLABUS

PAPERS – VI

Period: 24

Max.Marks:50

Credits: 2

Paper Title: Immunology.

Paper Code: ZOO-601GE (P)

Part – A

1. Demonstration of lymphoid organs (as per UGC guidelines).
2. Histological study of spleen, thymus and lymph nodes (through prepared slides).
3. Blood group determination.
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

REFERENCES BOOKS

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. Glodsky, Thomas J Kind, Barbara A. Osborne, Janis Kuby, Immunology, 5th ed, Freeman and Co. New York

Ivan Roitt, Immunology, 4th ed, JohanthanBrostoff, 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.

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A.P. (AUTONOMOUS)**

Immunology

Model Question Paper (External)

Paper Code: ZOO-601GE (P)

Practical - V

Max.marks:25m

1. Demonstration of lymphoid organs (as per UGC guidelines)5m
 2. Blood group determination 5m
 3. Study the following techniques given on photographs & Write notes on. 2x5=10m
A & B
 4. ELISA &. Immuno electrophoresis (demonstration) on site or of site demonstration. 5m
- Total: 25m.**

Guide lines for the Practical Examiners.

1. Demonstration of lymphoid organs
(5 marks for Procedure)
2. Blood group determination. .
(5 marks for Procedure)
3. Study the following techniques given on photographs& Write notes onA & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. ELISA (demonstration) on site or of site demonstration.
(5 marks for ELISAdemonstration)

**A.G& S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

Immunology

Model Question Paper (Internal)

Paper Code: ZOO-601GE (P)

Practical - VMax. Marks: 25

- | | | |
|----------------|----------|-----|
| 1. Attendance | -- | 5 M |
| 2. Record | -- | 10M |
| 3. Assignments | -- | 10M |
| | Total -- | 25M |

**ADUSUMILLI GOPALAKRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU- 521165, KRISHNA Dt., A.P. (AUTONOMOUS)**

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C) (Cluster Elective Paper: VIII-B-1)

w.e.f. - 2017 - 18

60 Hrs(4hrs/ week)

Paper Code : ZOO-602CE

Credits : 3

External : 70

Title of the Paper: **Principles of Aquaculture.**

Objective of the course: To introduce students into aquaculture practices

Course outcomes:

- ❖ Students get wider knowledge on aquaculture
- ❖ The study of students Types of Aquaculture ,culture systems and Culture Practices
- ❖ They learn about design and construction of aqua farms(pond formation)
- ❖ They study various economically important species
- ❖ Students get acquainted with sea weed and their benefits.

UNIT –I

- 1.1 Introduction / Basics of Aquaculture:- Definition, Significance and History of Aquaculture
- 1.2 Present status of Aquaculture – Global and National scenario
- 1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.
- 1.4 Criteria for the selection of species for culture

Unit – II

- 2.1 **Types of Aquaculture:** - Freshwater, Brackishwater and Marine
- 2.2 Concept of Monoculture, Polyculture, Composite culture, Monosex culture and integrated fish farming
- 2.3 **Culture systems:** - Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems
- 2.4 **Culture practices:**-Traditional, extensive, modified extensive, semi-intensive and intensive cultures of Fish and shrimp.

Unit – III

- 3.1 **Design and construction of aqua farms :-**Criteria for the selection of site for freshwater and brackish Water pond farms, Design and construction of fish and shrimp farms
- 3.2 **Seed resources:** - Natural seed resources and Procurement of seed for stocking: Carp and shrimp
- 3.3 **Nutrition and feeds:** - Nutritional requirements of a cultivable fish and shellfish
- 3.4 Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

- 4.1 **Management of carp culture ponds:-** Culture of Indian major carps: Pre-stocking management – Dewatering, drying, Predators, weeds and algal blooms and their control, Liming and Fertilization; Stocking management – Stocking density and stocking; Post-stocking Management – Feeding, water Quality, growth and health care; and harvesting of ponds
- 4.2 **Culture of giant freshwater prawn, *Macrobrachium rosenbergii***

Unit – V

- 5.1 **Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*)**
- 5.2 **Culture of pearl oysters**
- 5.3 **Culture of seaweeds-**species cultured, culture techniques, important by-products, prospects
- 5.4 **Culture of ornamental fishes** – Setting up and maintenance of aquarium; and breeding.

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SEMESTER-VI (Model Question paper)
Cluster Electives paper –VIII-B-1

Time: 3 hrs

Max.Marks:70

Paper Title: Principles of Aquaculture.

Paper Code: ZOO-602CE

Part - A

Answer **any four** questions out of eight in Part - A. Each question carries five marks. **4 X 5 = 20**

1. Aquaculture History- .
2. National Status of Aquaculture.
3. Monoculture. .
4. Cage culture

5. Criteria for selection of site for fresh water culture.
6. Seed resources of carp fish.

7. Pre- Stocking Management of carps.

8. Byproducts of sea weeds.

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries Ten marks. **5 X 10 = 50**

9. Describe any three cultivable species of fresh water ponds.
10. Write the criteria for the selection of species for culture.
11. Write an essay on water recirculated system.
12. Write an essay on types of Aquaculture which you have studied.
13. Give an account of design and construction of Aquaculture.
14. Explain natural and artificial feeds and their importance in fish feeding.
15. Give an account of post- stock Management of carps.
16. Give an account of culture of penaeus monodon.

SEMESTER-VI
Cluster Electives paper –VIII-B-1

Guide lines to the paper setter

Time: 3 hrs

Max.Marks:70

Paper Title: Principles of Aquaculture.

Paper Code: ZOO-602CE

Note: 1. Answer **any four** questions out of eight in Part-A. Each question carries five marks. $4 \times 5 = 20M$.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks. $5 \times 10 = 50M$.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

ZOOLOGY PRACTICAL

Periods: 24

Paper Title: Aquaculture (*Principles of Aquaculture*) Code: ZOO-C-I

Credits:2Max.Marks:50

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.
4. Determination of dosages of chemicals and drugs for treating common diseases.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample;
Estimation of dissolved oxygen, free carbon dioxide, total alkalinity, total Hardness, phosphates and nitrites.
2. Soil analysis – Determination of soil texture, pH, conductivity, available nitrogen, available Phosphorus and organic carbon.
3. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Each 5

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(AUTONOMOUS)

Practical - VI w.e.f. 2020–21.

(Principles of Aquaculture) Max. Marks: 25

Model Question Paper (External)

Paper Code: ZOO-C-I

I.Cultivable fishes:

1. Spotters: Identify, draw neat labeled diagram and comment on A, B, C & D 4X2=8m

II.Diseases:

2. Identification and study of fish and shrimp diseases- Using specimens/ Pictures A & B 2x2=4m
3. External examination of the diseased fish –diagnostic features and procedure. 3m
4. Determination of dosages of chemicals and drugs for treating common diseases 1x3=3m

III:Pond management:

5. Identification and study of common zooplankton, aquatic insects and aquatic weeds. A & B 2x2=4m
6. Salinity in the pond water sample. 3m

Total --

25M

Guide lines for the Practical Examiners. w.e.f. 2020–21.

1. Spotters: Identify and comment on A, B, C & D (Charts / Photographs). 4X2=8m
(Identification - $\frac{1}{2}$ mark, neat labeled diagram and Comments - $1\frac{1}{2}$ m)
2. Identify and comment on A & B (Charts / Photographs) 2x2=4m
(Identification - $\frac{1}{2}$ mark & Comments - $1\frac{1}{2}$ m)
3. External examination of the diseased fish –diagnostic features and procedure. 3m
(3 marks for Procedure)
4. Determination of dosages of chemicals and drugs for treating common diseases 1x3= 3m
5. Identification and study of common zooplankton, aquatic insects and aquatic weeds. 2x2=4m
(Identification - $\frac{1}{2}$ mark & Comments - $1\frac{1}{2}$ m)
6. Salinity in the pond water sample. 3m

Practical - VI

(Principles of Aquaculture)

Max. Marks: 25

Model Question Paper (Internal)

Code: ZOO-C-I

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
Total	--	25M

SEMESTER - VI w.e.f. - 2017 - 18

Class: III B.Sc (B.Z.C)

(Cluster Elective Paper: VIII-B-2)

60 Hrs. (4hrs/Week)

Paper Code : ZOO-603CE

Credits : 3

External : 75

Title of the Paper: Aquaculture Management.

Objectives of the course: To instruct students on aquaculture managerial skills.

Course out comes:

- ❖ Students get know about breeding technology of fishes, Hatching and hatching methodology.
- ❖ Students learn to analyse the quality of water and soil.
- ❖ They are trained on feed storage, Feeding strategies: Feeding devices, feeding schedules and ration size.
- ❖ They gain knowledge on diseases of fish and shrimp and the strategies involved in marketing.
- ❖ They study economics and Marketing , **Fisheries Extension and** important of fish genetics.

Unit – I

1.1 Breeding and Hatchery Management:- Bundh Breeding and Induced breeding of carp by Hypophysation; and Use of synthetic hormones.

1.2 Types of fish hatcheries; Hatchery management of Indian major carps

1.3 Breeding and Hatchery management of *Penaeus monodon/ Litopenaeus vannamei*

1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management:- Water quality and soil characteristics suitable for fish and shrimp culture

2.2 Identification of oxygen depletion problems and control mechanisms in culture ponds

2.3 Liming materials, Organic manures and Inorganic fertilizers commonly used and Their implications in fish ponds

Unit – III

3.1 Feed Management :- Live Foods and their role in shrimp larval nutrition.

3.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics. Feed formulation and manufacturing; Feed storage

3.3 Feeding strategies: Feeding devices, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

Unit – IV

4.1 Disease Management :- Principles of disease diagnosis and health management;

4.2 Prophylaxis, Hygiene and Therapy of fish diseases

4.3 Specific and non-specific defense systems in fish; Fish immunization and Vaccination

4.4 Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

4.5 Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases in shrimp ponds

Unit – V

5.1 Economics and Marketing :- Principles of aquaculture economics – variable costs, cost-benefit analysis ,Fish marketing methods in India; Basic concepts in demand and price analysis.

5.2 Fisheries Extension : Fisheries Training and Education in India; Role of extension in community development.

5.3 Fish Genetics Genetic improvement of fish stocks – Hybridization of fish. Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes,

SEMESTER-VI (Model Question paper)

Cluster Electives paper –VIII-B-2

Time: 3 hrs Max.Marks:70

Paper Title: Aquaculture Management. Paper Code: ZOO-603CE

Part - A

1. Answer **any four** questions out of eight in Part - A. Each question carries five marks. **4 X 5 = 25**

1. Bundh Breeding.
2. Types of hatcheries.
3. Liming Material.
4. Organic Manures.
5. Feed evaluation.
6. Supplementary feeds.
7. Symptoms of fish diseases.
8. Gynogenesis

Part – B

2. Answer **any five** questions out of eight in Part – B. Each question carries ten marks. **5 X 10 = 50**

9. Describe the induced breeding of carps by Hypophyston
10. Give an account of breeding and Hatchery management of panaeus monodon.
11. Describe the water quality characteristics of fish ponds
12. Describe the identification of oxygen depletion problems and control mechanisms in culture ponds.
13. Give an account of Feed formulation and manufacturing.
14. Write an essay on feeding strategies.
15. Describe symptoms therapy and prophylaxis of any three diseases related to prawn.
16. Write an essay on transgenic fish.

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(AUTONOMOUS)

SEMESTER-VI
Cluster Electives paper –VIII-B-2

Guide lines to the paper setter

Time: 3 hrs

Max.Marks:70

Paper Title: Aquaculture Management Paper Code: ZOO-603CE

Note: 1. Answer **any four** questions out of eight in Part-A. Each question carries five marks. 4 X 5 = 20M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks. 5 X 10 = 50M.

	PAR T	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	1	2	1	2
10 Marks Questions	B	2	2	2	1	1
Weightage		30	25	30	15	20

Note: 1. Please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

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A.P. (AUTONOMOUS)**

ZOOLOGY PRACTICAL

Credits: 2

Period: 24

Max.Marks:50

Paper Title: Aquaculturemanagement

Code : ZOO-C-II

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates, lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, Moisture in dried / cured products, examination of spoilage of dried / cured fish Products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. ?
4. Developing flow charts and exercises in identification of hazards – preparation of Hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

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Practical - VI

(Aquaculture management)

Max. Marks: 25

Model Question Paper (External)

Paper Code: ZOO-C-II

I. Nutrition:

1. Identification and study of Live food organisms- A & B 2X2=4m
2. Estimation of Proximate composition of aquaculture feeds – A & B 2x2^{1/2}=5m

II. Post harvest Technology:

3. Curd and fermented fish products (Procedure) 5m
4. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. 5m
5. Identification of hazards & Comment on A & B. 2x3=6m

Total-----25m

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Guide lines for the Practical Examiners.

Max. Marks: 25

1. Identify and comment on A & B (Charts / Photographs).
(Identification - $\frac{1}{2}$ mark and Comments - $1\frac{1}{2}$ m)
2. Estimation of Proximate composition of aquaculture feeds – A & B
(Composition –A- $2\frac{1}{2}$ Composition – B- $2\frac{1}{2}$)
3. Curd and fermented fish products (Procedure)
(5 marks for Procedure)
4. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
(If any one Procedure – 5 marks)
5. Identification of hazards & Comment on A & B
(Identification - 1 mark & Comments- 2m)

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Practical - VI

(Aquaculture management) Max. Marks: 25

Model Question Paper (Internal)

Code: ZOO-C-II

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
Total --		25M

SEMESTER - VI (CBCS)

Class: III B.Sc (B.Z.C) (Cluster Elective Paper: VIII-B-3) w.e.f. - 2017- 2018

Hrs(4hrs/Week) Paper Code: ZOO-604CE

Credits: 3 External: 70

Title of the Paper: **Postharvest Technology.**

Objective of the course: To prepare students to become future aqua culturists.

Course outcomes:

- ❖ Students are given techniques to handle fresh fish, storage, preservation and transport.
- ❖ They learn to extract maximum from fish and produce fish productions.
- ❖ They can earn while they learn.
- ❖ They are taught rules and regulations pertaining to quality control.
- ❖ Students get know about Quality Assurance, Management and Certification

Unit – I

1.1 Handling and Principles of fish Preservation: - Handling of fresh fish, storage and transport of fresh fish, post mortem changes (Rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, use of salt, use of fish preservatives, exposure to low radiation .

Unit – II

2.1 Methods of fish Preservation :- Traditional methods - sun drying, salt curing, pickling and smoking.

2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

3.1 Processing and preservation of fish and fish by-products:- Fish products – fish minced meat, fish meal fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish Powder, petfood from trash fish, fish manure.

3.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.3 Seaweed Products: -Preparation of agar, algin and carrageen. Use of seaweeds as food for human consumption.

Unit – IV

4.1. Sanitation and Quality control :- Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

4.2. Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

4.3. Regulatory affairs in industries

Unit – V

5.1 Quality Assurance, Management and Certification :- Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs) Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

5.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System.

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SEMESTER-VI (Model Question paper)

Cluster Electives paper –VIII-B-3

Time: 3 hrs Max.Marks:70

Paper Title: Postharvest Technology. Paper Code: ZOO-604CE

Part - A

Answer **any four** questions out of eight in Part - A. Each question carries five marks.**4 X 5 = 25**

1. Storage of fish.
2. Exposure of fish to low radiation of gamma rays.
3. Accelerated freeze drying.
4. Pickling of fish
5. Fish oils.
6. Fish meal.
7. Pre- processing control of fishery products.
8. Codex Alimentarius.

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries ten marks.**5 X 10 = 50**

9. Write the principles of fish preservation.
10. Write about spoilage in marine fish and fresh water fish.
11. Write about the Traditional methods of fish preservation like sun drying ,salt curing and smoking .
12. Give an account of advanced methods of preservation like chilling, freezing & canning.
13. Write an essay on any five fish byproducts.
14. Explain how sea weeds are useful in disease treatment and preparation of therapeutic drug.
15. Write an essay on environmental hygiene in processing plants.
16. Explain about the concept of hazard analysis & critical control points in sea food safety.

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SEMESTER-VI
Cluster Electives paper –VIII-B-3

Guide lines to the paper setterTime: 3 hrs

Max.Marks:70

Paper Title:Postharvest Technology.**Paper Code: ZOO-604CE**

*Note:*1. Answer **any four** questions out of eight in Part-A. Each question carries five marks.4X 5 = 20M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks.5 X 10 = 50M.

	PART	Unit –I	Unit – II	Unit-III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

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A.P. (AUTONOMOUS)**

ZOOLOGY PRACTICAL

Period: 24

Credits: 2 Paper Title: Post-harvest Technology

Code : ZOO-C-III (PROJECT)

Max.Marks:50

Project Work

Visit to a fish breeding centre / fish farms and submit a project report

Or

Visit to a feed manufacturing unit and submit a project report

Or

Visit to a shrimp hatchery / shrimp farms and submit a project report

Or

Visit to a shrimp processing unit and submit a project report

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(AUTONOMOUS)

Practical - VI

(Post-harvest Technology)

Max. Marks: 25

Model Question Paper (Internal)

Code: ZOO-C-III (PROJECT)

1. Attendance	--	5 M
2. Project Record – (Fish form)	--	20M
Total	--	25M

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
VUYYURU-521165, KRISHNA Dt., A.P. (Autonomous)**

**Accredited by NAAC with "A" Grade
2021-2022**



**DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES
EVEN SEMESTER
01-04-2022**

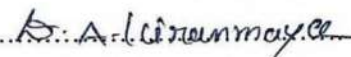

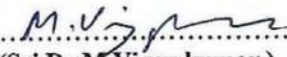
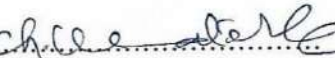
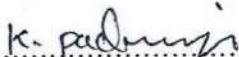
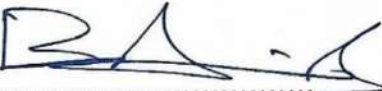
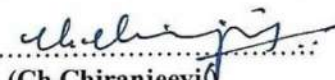


Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2:30 pm on 01.04.2022 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

Presiding

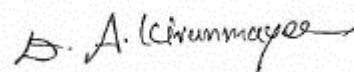
Members Present:

- 1)  Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee.) A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2)  University Nominee Bio Sciences & Bio technology
(Smt. Dr.L.Suseela.) Krishna University
Machilipatnam.
- 3)  Academic Council Head,Department of Zoology,
(Sri Dr.M.Viyay kumar.) Nominee SRR & CVR Govt. Degree College,
Vijayawada.
- 4)  Academic Council Head, Department of Zoology,
(Sri Ch. Venkateswaralu.) Nomine P.B. Siddhartha College,
Vijayawada.
- 5)  Member Lecturer in Zoology,
(Smt. K. Padmaja.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 6)  Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA
Manikonda.
- 7)  Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

ZOOLOGY

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of I B.Sc (B.Z.C) for the academic year 2021 - 2022.
2. To recommend the syllabi (Theory & Practical), Model question paper for IV Semester of II B.Sc (B.Z.C) for the academic year 2021 - 2022.
3. To discuss to the syllabus of Elective & Clusters in VI semesters to be for the academic year 2021-2022.
4. To recommend the syllabi (Theory & Practical), Model question paper for VI Semester of III B.Sc (B.Z.C) for the academic year 2021 - 2022.
5. To recommend the Blue print for the semester end exam for I, IV& VI semester of I,II,III B.Sc (B.Z.C) for the academic year 2021 - 2022.
6. To recommend the conduction of Value Added Course in Sericulture
6. To recommend the teaching and evaluation methods to be followed under Autonomous statues.
7. Any other matter.



CHAIRMAN

ZOOLOGY- RESOLUTIONS

1. It is resolved to continue the revised syllabi (Theory & Practical), model question paper & guide lines to be followed by the question paper setters of Zoology II semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS) to be approved by the Academic Council of 2021 – 2022. The syllabus is revised in all the units of II semester of I B.Sc. (B.Z.C) according to the suggestions of BOS members.

2. It is resolved to implement the Revised syllabi (Theory & Practical) as per the instructions of APSCHE, under Choice Based Credit System (CBCS) for Zoology IV Semester of II B.Sc. (B.Z.C) to be approved by the Academic Council of 2021 –2022. Two Papers are introduced in Sem IV with Titles Animal Physiology, Cellular metabolism and Embryology-Course Code-Zoo 401, and Immunology and Animal Bio-Technology Course-code Zoo-402

3. It is resolved to follow Elective – A (Immunology) in VI Semester from the Academic year 2021-2022 for IIB.Sc. BZC

4. It is resolved to continue the following teaching & evaluation methods for the Academic year 2021-22.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

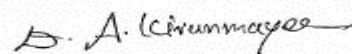
Evaluation of a student is done by the following procedure:

Internal Assessment Examination:

- Out of maximum 100 marks in each paper for II, III B.Sc, 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for II, III B.SC.
- Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment.
- Out of these 25 marks, 15 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated on the basis of candidate's percentage of attendance / assignment for II semester. There is no pass minimum for internal assessment for I, II, III B.Sc

Semester – End Examination:

- The maximum mark for II (BZC) semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- The maximum mark for II, III B.Sc semester- End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS"
- Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, IV, & VI semester for I, II & III B.Sc.
- Discussed and recommended for organizing Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.



Chairman

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Animal Diversity Biology of Chordates.**

Semester: - II

Course Code	ZOO T21A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering 2020-2021	Year of Revision – 2021-22	Percentage of Revision: 70%

Course Description:

This course will provide one with a basic and comprehensive understanding of *Pro chordates* and pisces origin, type study, respiratory, circulatory and nervous system etc., Enable the student with depth of topics and helps then to gain appreciation of Amphibia and Reptilia type studies, Aves and mammals type studies. On the other hand, importance of understanding parental care in amphibians, south indian chelonians, birds as glorified reptiles and significance of birds migration and flight adaptations in birds are learnt. A part from these the students will be enhanced with the knowledge of aquatic mammals and dentition in mammals.

Course Objectives:

- To understand the structural organization of animals of prochordates and cyclostomes.
- To understand the type study belonging to Pisces.
- To understand type study belonging to amphibian.
- To understand the type study belonging to reptilia and identification of poisonous snakes.
- To understand the type study belonging to Aves and Aquatic mammals.

Course Outcomes:

CO1	Gain knowledge in the major Chordate groups, describe their salient features, appreciate the diversity and analyze the uniqueness of different groups.
CO 2	Understand the fundamental organization of chordates and evaluate the similarities and differences among the different groups of chordates in the light of evolutionary significance.
CO 3	Comprehend and compare the morphology and anatomy of different classes of chordates and apply the same to their fitness in the ecological habitats
CO 4	Develop the skill of identifying the vertebrate fauna in general and South Indian fauna in specific.
CO 5	Acquaint with the significance of unique mechanisms and behavioral patterns exhibited by different groups of chordates.

Syllabus

Unit	Learning Units	Lecture Hours
I	UNIT I Protochordates to cyclostomes Protochordates Salient features of Urochordata and Cephalochordata 1 hour Structure and life-history of <i>Herdmania</i> , 2 hours Significance of retrogressive metamorphosis. 2 hours General organization of vertebrates 1 hour General characters of cyclostomes 1 hour Comparison of <i>Petromyzon</i> and <i>Myxine</i> 1 hour	8 hrs
II	UNIT II Fishes Type study – <i>Scoliodon</i> - Morphology, respiratory, circulatory, excretory and nervous systems and sense organs. 8hrs Migration in fishes. 1 hour Viviparity in fishes 1 hour Types of scales 1 hour Accessory respiratory organs in fishes 2 hours	13 HOURS
III	UNIT III Amphibia South Indian Amphibians. 1 hour Type study - <i>Rana</i> : Morphology, digestive system, respiratory system, circulatory system, excretory system, nervous system and reproductive system 9 hours Parental care in amphibians 1 hour	11 HOURS
IV	UNIT IV Reptilia South Indian Chelonians. 2 hours Type study – <i>Calotes</i> : Morphology, digestive, respiratory, circulatory, urinogenital and nervous systems. 8hrs Identification of poisonous snakes 1 hour	11 HOURS
V	UNIT V Aves and Mammalia Aves Birds as Glorified Reptiles. 2 hours Type study - Pigeon (<i>Columba livia</i>): Exoskeleton, respiratory, circulatory and excretory systems 7 hours Significance of migration in birds 2 hours Flight adaptations in birds 2 hours Mammalia Aquatic Mammals 2 hours Dentition in Mammals. 2 hours	17 HOURS

Textbooks

1. R.L. Kotpal, *Modern Text Book of Zoology - Invertebrates*.
2. P.S. Dhama and J.K. Dhama *Invertebrate Zoology*.

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. Marshall, 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

Course Delivery method: Face-to-face / Blended.

Course has focused on: Foundation

Websites of Interest:

https://www.youtube.com/watch?v=-mcfPHd_sH8

<https://www.youtube.com/watch?v=U8F9IzuwdzQ><https://www.youtube.com/watch?v=jhXqIy49YEw>

<https://www.youtube.com/watch?v=ywD50XyayFk>

Co-curricular Activities:

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus.
- Visit to local fish market and identification of local cartilaginous and bony fishes.
- Maintaining of aquarium by students.
- Thermocol model of fish heart and brain.
- Preparation of slides of scales of fishes.

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Semester II

(Model question paper)

Title of the paper:- ANIMAL DIVERSITY - BIOLOGY OF CHORDATES

Course Code: ZOO T21A

Time: 3 Hrs

Max. Marks: 75M

Draw neat labeled diagrams wherever necessary.

SECTION-A

Answer any Five of the following.

5X5= 25M

1. Describe the structure of *Herdmania*– CO1 L2
2. Enumerate the general characters of Cephalochordata – CO1 L1
3. Explain the different types of Scales in fishes –CO2 L2
4. Enumerate the different South Indian Amphibians – CO3, L4
5. Describe the Female Genital System in *Calotes*– CO4, L2
6. Describe the structure of a Quill feather – CO5, L1
7. Explain and Illustrate the structure of Tooth – CO5, L3
8. Give an account of the lateral line system in *Scoliodon*- CO2, L2

SECTION-B

Answer the following Questions.

5X10=50M

9. (a). What is meant by Retrogressive Metamorphosis? Apply the phenomenon with reference to the development of *Herdmania* – CO1, L3

(Or)

(b). Enumerate the General characters of Cyclostomes – CO1 L3

10. (a). Describe the Respiratory system in *Scoliodon*– CO2, L2

(Or)

(b) Explain the significance of Accessory respiratory organs –CO3, L2

11.(a) Describe Respiratory system in *Rana*– CO3, L2

(Or)

(b). Discuss Parental Care in Amphibians – CO3 L2

12.(a). Explain about the South Indian Chelonians – CO4, L2

(Or)

(b). Describe the Arterial System in *Calotes*- CO4, L2

13.(a) Describe the Respiratory system in Penguin – CO,5 L2

(Or)

(b). Explain about the Aquatic Mammals – CO5, L2

PRACTICAL - II

w.e.f. 2021-2022.

Code: ZOO T21A

Title of the paper: - Animal Diversity Biology of Chordates.

MAX.MARKS: 50.

(2hrs/week)

Course Prerequisites:

Knowledge of vertebrates acquired in Intermediate

Course Description:

This course will provide one with a basic and comprehensive understanding of *Pro chordates* and pices origin, type study, respiratory, circulatory and nervous system etc., Enable the student with depth of topics and helps then to gain appreciation of Amphibia and reptalia type studies, Aves and mammals type studies. On the other hand, importance of understanding parental care in amphibians, south indian chelonians, birds as glorified reptailles and significance of bird's migration and flight adaptations in birds are learnt. A part from these the students will be enhanced with the knowledge of aquatic mammals and dentition in mammals.

LEARNING OUTCOMES:

By the end of the course students will be able to

1. to Understand the general characters and classification from Pisces to Mammalia
2. to Understand the importance of preservation of museum specimens
3. to Identify chordates based on special identifying characters
4. to Understand different organ systems through demo or virtual dissections

COURSE OUTCOMES:

CO1	To identify the systematic position of Protochordata, Cyclostomata and Pisces.
CO2	To identify the systematic position of Amphibians and Reptiles.
CO3	To identify the systematic position of Aves and mammals.
CO4	To Study the Appendicular skeleton of <i>Varanus</i> , <i>Gallus</i> and <i>Oryctolagus</i> .
CO5	To understand the various systems of Fish by Dissecting and process of Mounting

SYLLABUS:

General characters and classification of the following phyla and sub-phyla up to classes with suitable examples: Pisces (up to subclass only), Amphibia (up to orders), Reptilia (up to orders) Aves (up to subclass only) and Mammalia (up to infraclass only).

I. SPECIMENS.

1. Protochordata: Herdmania, Amphioxus.

Slides: Amphioxus T.S through pharynx.

2. Cyclostomata: Petromyzon, Myxine.

3. Pisces: Pristis, Torpedo, Channa, Pleuronectes, Labeo, Catla, Hippocampus, Exocoetus, Echeneis, Clarias, Anguilla.

Slides: Fish scales.

4. Amphibia: Ichthyophis, Amblystoma, Siren, Axolotl larva, Hyla, Rhacophorus.

5. Reptilia: Trionyx, Testudo, Draco, Chamaeleon, Uromastix, Daboia (=Vipera russelli)

Naja, Enhydrina, Bungarus, Crocodilus.

6. Aves: Psittacula, Bubo, Alcedo, Passer, Eudynamis, Corvus

Different types of feathers- quill, contour, filoplume and down.

7. Mammalia: Ornithorhynchus, Didelphys, Pteropus, Funambulus, Manis, Erinaceus.

II. OSTEOLOGY.

Appendicular skeleton of *Varanus*, *Gallus* and *Oryctolagus* - limbs and girdles.

III. DEMONSTRATION OF DISSECTIONS

1. Mounting of fish scales.

2. *Channa*: Digestive system

3. *Scoliodon*: V, VII, IX and X cranial nerves.

Suggested Manuals:

Suggested manuals

1. Practical Zoology – Vertebrata - S.S.Lal

2. A manual of Practical Zoology – Chordata P.S.Verma

Co-curricular Activities:

Preparation of slides of scales of fishes

- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)

heart/brain/lungs, identification of snakes etc.)

- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons

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A.P. (AUTONOMOUS)**

II B.Sc. ZOOLOGY PRACTICAL EXAMINATION

PRACTICAL- II COURSE CODE: ZOO P21A
TITLE OF THE PAPER: ANIMAL DIVERSITY - BIOLOGY OF CHORDATES
Time: 3hrs.

Max. Marks 40M

SEE MODEL PAPER

1. List out the general characters of Class Mammalia. CO5, L1 5 M

2. Identify and draw a neat labelled diagram of digestive system of *Channa*. CO2, L3 10 M
Identification: 2M
Diagram: 4 M
Labelling: 4 M

3. Identify, draw a labelled diagram, classify and write notes on A, B, C, D and E CO1,2,3,4,5 L2 5 X 3 = 15 M
A. Protochordata and Cyclostomata
B. Pisces
C. Amphibia and Reptilia
D. Aves and Mammalia
E. Osteology
Identification: 1 MP
Diagram : $\frac{1}{2}$ M
Classification: $\frac{1}{2}$ M
Comment 1 M

4. Practical Record Book CO1, 2,3,4,5 L3 5 M

5. VIVA CO1, 2,3,4,5 L5 5 M

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NAAC reaccruited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **ANIMAL PHYSIOLOGY, CELLULAR METABOLISM ANDEMBRYOLOGY**

Semester: - IV

Course Code	ZOO-401	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2019-20	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 100%

Course Outcomes:

This course will provide students with a deep knowledge in Physiology, Cellular metabolism and Molecular Biology and by the completion of the course the graduate shallable to–

CO1: Understand the functions of important animal physiological systems including digestion, cardio-respiratory and renal systems.

CO2: Understand the muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with special knowledge of hormonal control of human reproduction.

CO3: Describe the structure, classification and chemistry of biomolecules and enzymes responsible for sustenance of life in living organisms

CO4: Develop broad understanding the basic metabolic activities pertaining to the catabolism and anabolism of various biomolecules

CO5 : Describe the key events in early embryonic development starting from the formation of gametes upto gastrulation and formation of primary germ layers.

Learning Objectives

- To achieve thorough understanding of various aspects of physiological systems and their functioning in animals.
- To instill the concept of hormonal regulation of physiology, metabolism and reproduction in animals.
- To understand the disorders associated with the deficiency of hormones
- To demonstrate thorough knowledge of the intersection between the disciplines of Biology and Chemistry.
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes
- To make students gain proficiency in laboratory techniques in biochemistry and orient them to apply the scientific method to the processes of experimentation and hypothesis testing.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Animal Physiology -I Process of digestion and assimilation Respiration - Pulmonary ventilation, transport of oxygen and CO₂ (Note: Need not study cellular respiration here) Circulation - Structure and functioning of heart, Cardiac cycle Excretion - Structure and functions of kidney urine formation, counter current Mechanism</p>	10
II	<p>Animal Physiology –II Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas Hormonal control of reproduction in a mammal</p>	15
III	<p>Cellular Metabolism –I (Biomolecules) Carbohydrates - Classification of carbohydrates. Structure of glucose Proteins - Classification of proteins. General properties of amino acids Lipids - Classification of lipids Enzymes: Classification and Mechanism of Action</p>	15
IV	<p>Cellular Metabolism –II Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis Lipid Metabolism – β-oxidation of palmitic acid Protein metabolism – Transamination, Deamination and Urea Cycle</p>	10
V	<p>Embryology: Gametogenesis Fertilization Types of eggs Types of cleavages Development of Frog up to formation of primary germ layers</p>	10

REFERENCEBOOKS

1. Eckert H. *Animal Physiology: Mechanisms and Adaptation*. W.H. Freeman & Company.
2. Flory E. *An Introduction to General and Comparative Animal Physiology*. W.B. Saunders Co., Philadelphia.
3. Goel KA and Satish KV. 1989. *A Text Book of Animal Physiology*, Rastogi Publications, Meerut, U.P.
4. Hoar WS. *General and Comparative Physiology*. Prentice Hall of India, New Delhi.
5. Lehninger AL, Nelson and Cox. *Principles of Biochemistry*. Lange Medical Publications, New Delhi.
6. Prosser CL and Brown FA. *Comparative Animal Physiology*. W.B. Saunders Company, Philadelphia.
7. *Developmental Biology* by Balinsky
8. *Developmental Biology* by Gerard Karp
9. *Chordate embryology* by Varma and Agarwal
10. *Embryology* by V.B. Rastogi
11. Austen CR and Short RV. 1980. *Reproduction in Mammals*. Cambridge University Press.
12. Gilbert SF. 2006. *Developmental Biology*, 8th Edition. Sinauer Associates Inc., Publishers, Sunderland, USA.
13. Longo FJ. 1987. *Fertilization*. Chapman & Hall, London.
14. Rastogi VB and Jayaraj MS. 1989. *Developmental Biology*. Kedara Nath Ram Nath Publishers, Meerut, Uttar Pradesh.
15. Schatten H and Schatten G. 1989. *Molecular Biology of Fertilization*. Academic Press, New York.

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Semester IV *w.e.f. 2021-2022*

(Model question paper)

Title of the paper: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM ANDEMBRYOLOGY

Code – ZOO-401C

Time: 3hrs.

max.marks: 70

Section – A 4 x 5 = 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

1. Cardiac cycle
2. Non-myelinated nerve fibers
3. pituitary gland
4. Structure of glucose
5. Glycolysis
6. Urea Cycle
7. Fertilization
8. Types of cleavages

Section – B 5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Give an account of process of digestion in mammals?
10. Describe the Structure and functions of Mammal heart?
11. Explain about the production of Nerve Impulse?
12. Explain about the hormonal control of reproduction in mammals?
13. Give an account of Classification of carbohydrates?
14. Discourse about General properties of amino acids?
15. Explain about Krebs cycle ?
16. Write an essay on types of eggs?

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Semester -IV**

Guide lines to the Paper Setter.

W.e.f. 2021-2022

Title of the paper: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM ANDEMBRYOLOGY

Code – ZOO-401C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A. Each question carries five marks. $4 \times 5 = 20M$.

2. Answer any **five** questions out of eight in Section – B. Each question carries Ten marks. $5 \times 10 = 50M$.

	Section	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
5 Marks Questions	A	1	2	1	2	2
10 Marks Questions	B	2	2	2	1	1
Weightage		25	30	25	20	20

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be in English medium.

PRACTICAL - IV

Code: ZOO- 401P

w.e.f. 2021-2022.

ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

MAX.MARKS: 50.

(2hrs/week)

PRACTICAL SYLLABUS

Learning Objectives:

- Identification of an organ system with histological structure
- Deducing human health based on the information of composition of blood cells
- Demonstration of enzyme activity *in vitro*
- Identification of various biomolecules of tissues by simple colorimetric methods and also quantitative methods
- Identification of different stages of early embryonic development in animals

I. ANIMAL PHYSIOLOGY

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Study of activity of salivary amylase under optimum conditions
3. T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
4. Differential count of human blood

II. CELLULAR METABOLISM

1. Estimation of total proteins in given solutions by Lowry's method.
2. Estimation of total carbohydrate by Anthrone method.
3. Qualitative tests for identification of ammonia, urea and uric acid
4. Protocol for Isolation of DNA in animal cells

III. EMBRYOLOGY

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Construction of fate map of frog blastula

REFERENCE BOOKS:

- Harper's Illustrated Biochemistry
- Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley & sons. Inc.
- Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- Laboratory techniques by Plummer

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PAPER – IV**

(Animal physiology, Cellular Metabolism and Embryology)

w.e.f.2021-22.

*Model Question paper (External)*Max.Marks: 25 M.
Paper Code: ZOO-401P

I.Embryology:

1. Identify, draw neat labeled diagram & comment on. 2x 1^{1/2} = 3M.

A & B

II. Physiology& Cellular Metabolism

2. Identify, draw neat labeled diagram & comment on .2x 1^{1/2} = 3M. **A & B**

3. Studyof activityof salivaryamylaseunder optimumconditions 4M

4. Identify the Qualitative test for in the given samples A & B, each with two tests. 4x 1^{1/2} = 6M.

(Sample A- 2X1^{1/2} =3 Marks & sample B -- 2X1 ^{1/2} =3 Marks)

5. Identify the Qualitative test for in the given samples A & B, each with two tests. 4x 1^{1/2} = 6M.

(Sample A- 2X1 ^{1/2} =3 Marks & sample B -- 2X1 ^{1/2} =3 Marks)

6. Identify, draw neat labeled diagram &comment on. 2x 1^{1/2} = 3M.

A & B

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ZOOLOGY PRACTICAL -IV**

**(INTERNAL)
w.e.f. 2021-2022.**

(2hrs/week).

(Animal physiology, Cellular Metabolism and Embryology)

Code: ZOO-401P.

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 5M.
2. Record ----- 10M.
3. Assignment -----10M.

Total ----- 25M.

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Title of the Paper: **IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**

Semester: - IV

Course Code	ZOO-402	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2019-20	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 100%

Course Outcomes:

This course will provide students with a deep knowledge in immunology, genetics, embryology and ecology and by the completion of the course the graduates shall be able to –

CO1: To get knowledge of the organs of the immune system, types of immunity, cells and organs of immunity.

CO2: To describe immunological responses and how they are triggered (antigens) and regulated (antibodies)

CO3: Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

CO4: Get familiar with the tools and techniques of animal biotechnology.

Learning Objectives

- To trace the history and development of immunology
- To provide students with a foundation in immunological processes
- To be able to compare and contrast the innate versus adaptive immune systems and humoral versus cell-mediated immune responses
- Understand the significance of the Major Histocompatibility Complex in terms of immune response and transplantation
- To provide knowledge on animal cell and tissue culture and their preservation
- To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
- To explain *in vitro* fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To understand principles of animal culture, media preparation

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	Immunology –I(OverviewofImmunesystem) IntroductiontobasicconceptsinImmunology Innateandadaptiveimmunity,VaccinesandImmunizationprogramme Cellsofimmunesystem Organsofimmunesystem	10
II	Immunology –II (Antigens,Antibodies, MHCandHypersensitivity) Antigens:Basicpropertiesofantigens,BandTcellepitopes,haptensandadjuvants;Factors influencingimmunogenicity Antibodies:Structureof antibody,Classesand functionsofantibodies Structureandfunctionsofmajor histocompatibilitycomplexes ExogenousandEndogenouspathwaysofantigenpresentationandprocessing Hypersensitivity–ClassificationandTypes	15
III	Techniques AnimalCell,TissueandOrganculturemedia:NaturalandSyntheticmedia, Cellcultures:Establishmentofcellculture(primaryculture,secondaryculture, types of cell lines; Protocols for Primary Cell Culture); EstablishedCell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organculture;Cryopreservation of cultures Stemcells:Typesofstemcellsandapplications Hybridoma Technology: Production & applications of Monoclonal antibodies(mAb)	15
IV	Genetic Engineering:Basic concept, Vectors, Restriction Endonucleases andRecombinantDNATEchnology Gene delivery:Microinjection, electroporation, biolistic method (gene gun),liposomeand viral-mediated genedelivery Transgenic Animals:Strategies of Gene transfer; Transgenic - sheep, - fish; applications Manipulationofreproductioninanimals:Artificial Insemination, <i>Invitro</i> fertilization,superovulation,Embryotransfer,Embryo cloning	10
V	PCR:BasicsofPCR. DNA Sequencing: Sanger’s method of DNA sequencing- traditional andautomatedsequencing (2 hrs) Hybridizationtechniques:Southern,Northernand Westernblotting DNafingerprinting:Procedureandapplications Applicationsin IndustryandAgriculture: Fermentation:Different types of Fermentation and Downstream processing; Agriculture: Monocultureinfishes, polyploidyinfishes	10

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Semester IV *w.e.f. 2021-2022*

(Model question paper)

Title of the paper: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Code – ZOO-402C

Time: 3hrs.

max.marks: 70

Section – A

4 x 5 = 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

1. Organs of immune system
2. Haptens
3. Types of stem cells
4. BHK
5. Electroporation
6. Transgenic - sheep
7. Western blotting
8. polyploidy in fishes

Section – B 5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Give an account of Innate and adaptive immunity?
10. Describe the cells of immune system ?
11. Explain about the Structure and function of major histocompatibility complexes?
12. Explain about the Hypersensitivity – Classification and Types?
13. Give an account of Cryopreservation of cultures ?
14. Discourse about Production & applications of Monoclonal antibodies (mAb)
15. Explain about endonucleases and Recombinant DNA technology?
16. Different types of Fermentation and Downstream processing ?

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Krishna Dt. A.P. (Autonomous)
Semester -IV**

Guide lines to the Paper Setter.

w.e.f. 2021-2022

Title of the paper:IMMUNOLOGYANDANIMALBIOTECHNOLOGYCode – ZOO-402C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A. Each question carriesfive marks. 4x5 = 20M.

2. Answer any **five** questions out of eight in Section – B. Each question carriesTen marks. 5x10= 50M.

	Section	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
5 Marks Questions	A	1	1	2	2	2
10 Marks Questions	B	2	2	2	1	1
Weightage		25	25	30	20	20

- Note:** 1. please provide the scheme of valuation for the paper.
2. Question paper should be in English medium.

PRACTICAL - IV

w.e.f. 2021-2022. Code: ZOO- 402P

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

MAX. MARKS: 50.

(2hrs/week)

PRACTICAL SYLLABUS

Learning Objectives:

- Acquainting student with immunological techniques vis-à-vis theory taught in the classroom
- Interconnect the theoretical and practical knowledge of immunity with the outer world for the development of a healthier life.
- Demonstrate basic laboratory skills necessary for Biotechnology research
- Promoting application of the lab techniques for taking up research in higher studies

I. IMMUNOLOGY

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

II. Animal biotechnology

1. DNA quantification using DPAM method.
2. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
3. Separation, Purification of biological compounds by paper, Thin-layer and Column chromatography
4. Cleaning and sterilization of glass and plastic wares for cell culture.
5. Preparation of culture media.

REFERENCE BOOKS

1. Immunology Lab Biology 477 Lab Manual; Spring 2016 Dr. Julie Jameson
2. Practical Immunology A Laboratory Manual; LAP LAMBERT Academic

Publishing

3. Manual of laboratory experiments in cell biology by Edward, G Laboratory Techniques by Plummer

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(AUTONOMOUS)
PAPER – IV

(IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY)

w.e.f.2021-22.

Model Question paper (External) Max.Marks: 25 M.

Paper Code: ZOO-402P

-
- | | |
|--|-------|
| 1. Blood group determination. | 5 m |
| 2. Demonstration of ELISA. | 5m |
| 3. Preparation of culture media. | 5m |
| 4. Study the following techniques given on photographs & Write notes on. | 4X2=8 |
| .A.spleen, | |
| B.Lymph nodes | |
| C.Western Blot, | |
| D. DNA Fingerprinting | |
| 5. Cleaning of glass wares for cell culture. | 2m |

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ZOOLOGY PRACTICAL -IV

(INTERNAL)

w.e.f. 2021-2022.

(2hrs/week).

(IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY)

Code: ZOO-402P.

Max.marks:25M.

Time: 3hrs.

- | | | |
|---------------|-------|------|
| 4. Attendance | ----- | 5M. |
| 5. Record | ----- | 10M. |
| 6. Assignment | ----- | 10M. |
| Total | ----- | 25M. |

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Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Immunology**

Semester: - VI

Course Code	ZOO-601C	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2019	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

Objective of the course: To facilitate students to understand the role of immune system in the body, cells and organs of immune system, their structures and functioning

Course out comes:

- Students grow in understanding of immune system, to improve their immunity and to protect them from pathogens.
- They identify their blood groups, their compatibility and the need to donate blood to save life.
- Students identify the classes, structures and functions of antibodies, antigen – antibody reactions.
- This study enables students to take care of themselves and take timely precautions against various diseases.
- They identify the cure of different diseases through various vaccines, the instruments involved in identification of immune reactions etc.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	UNIT- I: Overview of Immune system Introduction to basic concepts in Immunology. Innate and adaptive immunity *Cells and organs of Immune system Cells of immune system Organs of immune system	10
II	UNIT-II:Antigens Basic properties of antigens B and T cell epitopes, haptens and adjuvants Factors influencing immunogenicity	10
III	UNIT-III: Antibodies Structure of an antibody Classes and functions of antibodies Antigen and antibody interactions. Monoclonal antibodies and their production.	15
IV	UNIT-IV: Working of an Immune system Structure and functions of major histocompatibility complexes Exogenous and Endogenous pathways of antigen presentation and processing Basic properties and functions of mediator molecules. (cytokines, interferons and complement proteins). Mechanisms of humoral and cell mediated immunities	15
V	UNIT-V: Immune system in health and disease Classification and brief description of various types of hyper sensitivities Introduction to concepts of autoimmunity and immunodeficiency *Vaccines General introduction to vaccines Types of vaccines	10

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KRISHNA Dt.,A.P. (AUTONOMOUS)
SEMESTER-VI (Model Question paper)**

Paper Title: Immunology

Paper Code:ZOO-601GEw.e.f. 2021 – 2022.

Time: 3 hrs

Max.Marks:70

SECTION-A

Answer **any four** questions out of eight in Part - A. Each question carries five marks. **4 X 5 = 20m**

1. Active immunity
2. Monoclonal antibodies .
3. T Cell Epitope
4. Structure of antibody.
5. Functions of major histo compatibility complexes (MHC)
6. Humoral immunity.
7. Causes of autoimmune diseases .
- 8 .BCG Vaccine .

Part – B

Answer **any five** questions out of eight in Part – B. Each question carries ten marks **5 X 10 =50m**

9. Give an account of innate immunity.
10. Write an essay on primary lymphoid organs.
11. Discuss about the basic properties of Antigen.
12. Write an essay on immunogenicity.
13. Describe about different types of immunoglobulins.
14. Give an account of basic properties and functions of Cytokines.
15. Define Hypersensitivity. Explain it in detail.
16. Explain different types of vaccines.

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A.P. (AUTONOMOUS)**

**SEMESTER-VI
ZOOLOGY ELECTIVE PAPER-VII (A)**

Guide lines to the paper setter w.e.f. 2021 – 2022.

Paper Title: Immunology. **Paper Code:** ZOO-601GE

Time: 3 hrs

Max.Marks:70

Note: 1. Answer **any four** questions out of eight in Part-A. Each question carries five mark 4 X 5= 20M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks. 5 X 10= 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	1	1	2	2	2
10 Marks Questions	B	2	2	1	1	2
Weightage		25	25	20	20	30

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

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ZOOLOGY PRACTICAL SYLLABUS

PAPERS – VI

w.e.f. 2021 – 2022.

Period: 24

Max.Marks:50

Credits: 2

Paper Title: Immunology.

Paper Code: ZOO-601GE (P)

Part – A

1. Demonstration of lymphoid organs (as per UGC guidelines).
2. Histological study of spleen, thymus and lymph nodes (through prepared slides).
3. Blood group determination.
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

REFERENCES BOOKS

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, JohanthanBrostoff, Moshy, London.
Thomas C. Chung, *General Parasitology*, Hardcourt Brace and Co ltd. Asia. New Delhi.
Gerard D. Schmidt and Larry S Roberts, *Foundations of Parasitology*, McGraw Hill
Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. Immunology. W.H. Freeman and Company.
Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition. Roitt's Essential Immunology, Blackwell Publishing.

**A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)**

Model Question Paper (External)

Immunology

Practical - VI

w.e.f. 2021 – 2022.
Paper Code: ZOO-601GE (P)
Max.marks:25m

-
1. Demonstration of lymphoid organs (as per UGC guidelines)5m
2. Blood group determination 5m
3. Study the following techniques given on photographs & Write notes on. 2x5=10m
A & B
4. ELISA & Immuno electrophoresis (demonstration) on site or of site demonstration. 5m
- Total: 25m.
Total: 25m
-

Guide lines for the Practical Examiners.

1. Demonstration of lymphoid organs
(5 marks for Procedure)
2. Blood group determination. .
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. ELISA (demonstration) on site or of site demonstration.
(5 marks for ELISA demonstration)
-

A.G & S. G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU - 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)

Immunology.

Model Question Paper (Internal)
Practical - VI

Paper Code: ZOO-601GE (P)
Max. Marks: 25

1. Attendance	--	5 M
2. Record	--	10M
3. Assignments	--	10M
Total	--	25M

**A.G & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
VUYYURU-521165, KRISHNA Dt., A.P. (Autonomous)**

Accredited by NAAC with "A" Grade



**DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES
ODD SEMESTER
01-11-2021**

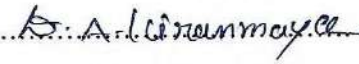
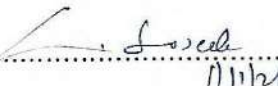
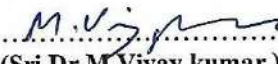

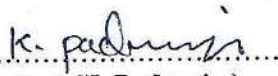
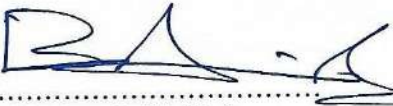



Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2:30 pm on 01-11-2021 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

Presiding

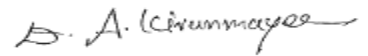
Members Present:

- 1)  Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee.) A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2)  University Nominee Bio Sciences & Bio technology
(Smt. Dr.L.Suseela.) Krishna University
Machilipatnam.
- 3)  Academic Council Head,Department of Zoology,
(Sri Dr.M.Viyay kumar.) Nominee SRR & CVR Govt. Degree College,
Vijayawada.
- 4)  Academic Council Head, Department of Zoology,
(Sri Ch. Venkateswaralu.) Nomine P.B. Siddhartha College,
Vijayawada.
- 5)  Member Lecturer in Zoology,
(Smt. K. Padmaja.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 6)  Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA
Manikonda.
- 7)  Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

ZOOLOGY

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for I Semester of I B.Sc (B.Z.C) for the academic year 2021 - 2022.
2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II B.Sc (B.Z.C) for the academic year 2021 - 2022.
3. To recommend the syllabi (Theory & Practical), Model question paper for V Semester of III B.Sc (B.Z.C) for the academic year 2021 - 2022.
4. To recommend the Blue print for the semester end exam for I, III & V semester of I, II, III B.Sc (B.Z.C) for the academic year 2021 - 2022.
5. To introduce Life Skill Course Environmental Studies for I year students in this academic year 2021-22.
6. To introduce Skill Development Course Poultry Farming for III year students in this academic year 2021-22.
7. To recommend the teaching and evolution methods to be followed under Autonomous statues.
8. Any other matter.



Chairman

ZOOLOGY- RESOLUTIONS

1. It is resolved to continue the changed syllabi (Theory & Practical), model question paper & guide lines to be followed by the question paper setters of Zoology of I semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS) approved by the Academic Council of 2021 – 2022.
2. It is resolved to implement **the new paper Cell Biology, Genetics, Molecular Biology & Organic Evolution** (Theory & Practical), to be followed under Choice Based Credit System (CBCS) in Zoology of III Semester of II B.Sc. (B.Z.C) approved by the Academic Council of 2021 – 2022.
3. It is resolved to implement the same syllabi & model papers under Choice Based Credit System (CBCS) Setters of Zoology of V semester of III B.Sc. (B.Z.C) approved by the Academic Council of 2021-2022.
4. It is resolved to Continue the same Blue prints of I, III, & V Semesters of B.Sc Zoology for the Academic year 2021-2022.
5. It is resolved to implement Life skill Course for I year students.
6. It is resolved to implement Skill Development Course for II year students.
7. It is resolved to continue the following teaching & evolution methods for the Academic year 2021-22.
8. Any other matter.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

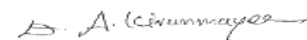
Evaluation of a student is done by the following procedure:

❖ Internal Assessment Examination:

- ❖ Out of maximum 100 marks in each paper for II, III B.Sc, 30 marks shall be allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for II, III B.SC.
- ❖ Out of maximum 100 marks in each paper for I B.Sc, 25 marks shall be allocated for internal assessment.
- ❖ Out of these 25 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5marks allocated on the basis of candidate's percentage of attendance / assignment for I semester.
- ❖ There is no pass minimum for internal assessment for I, II, III B.Sc

❖ Semester – End Examination:

- ❖ The maximum mark for I (BZC) semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- ❖ The maximum mark for II, III B.Sc semester- End examination shall be 70 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”
- ❖ Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, III, & V semester for I, II & III B.Sc.
- ❖ Discussed and recommended for organizing Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.



Chairman

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).

ALLOCATION OF CREDITS

For the Papers offered during I,III & V Semesters

<i>Year</i>	<i>Semester</i>	<i>Title</i>	<i>Teaching hours</i>	<i>Internal marks</i>	<i>External marks</i>	<i>Credits</i>
I	I	Animal Diversity – I Biology of Non-Chordates	4	25	75	03
		Animal Diversity -Biology of Non-Chordates – Practical - I	2	10	40	01
II	III	Cell Biology, Genetics, Molecular biology & Evolution	4	30	70	03
		Practical Cell Biology, Genetics, Molecular biology & Evolution	2	25	25	01
III	V(501)	Animal Bio technology	4	30	70	03
		Practical – 501p Animal Bio technology	2	25	25	01
	V(502)	Animal Husbandry	4	30	70	03
		Practical – 502p Animal Husbandry	2	25	25	01
		Total Credits				16

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NACC reaccredited at 'A' level

Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Animal Diversity Biology of Non – Chordates**

Semester: - I

Course Code	ZOOT11A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

AIM

- To know the biodiversity of invertebrates

LEARNING OBJECTIVES

- To understand the structural organization of animals from Protozoa to Hemichordate
 - To understand the evolutionary relationship of different phyla from Protozoa to Hemichordate
 - To understand the specific phenomena exhibited by different groups of invertebrates from Protozoa to Hemichordate
 - To understand the taxonomic position and affinities of certain groups of invertebrates
- AsConnecting links
- To study the life cycles, and pathogenicity of certain

PREREQUISITE

- Knowledge of invertebrates acquired in Intermediate

COURSE OUTCOMES

By the end of the course students will be able to

CO 1 Gain knowledge in the fundamental concepts underlying the structural complexity in the organization of invertebrates.

CO 2 Understand biology and pathogenicity of parasites and their adaptations analyse remedial and preventive measures and promote the same in public domain.

CO 3 Appreciate and evaluate the economic, commercial, medicinal and culture importance of invertebrates and their larval stages in relation to phylogeny

CO 4 Describe the significance of connecting links in understanding the concept of evolution

CO 5 Explain the significance of specific phenomena in different group's of invertebrates in relation to their adaptability for survival

CO 6 Comprehend the systems biology of individual phyla with a specific type study and understand the origin and evolutionary relationship of different phyla and appreciate the uniqueness of individual phyla.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>PROTOZOA AND PORIFERA Introduction to Non-chordates – Origin of metazoans Type study: <i>Polystomella</i>(structure and life cycle) Locomotion in protozoans Nutrition in protozoans Type study: <i>Sycon</i>(Structure, histology and skeleton) Canal system in sponges</p>	13
II	<p>CNIDARIA AND CTENOPHORA Type study: <i>Obelia</i>. (Structure – polyp and medusa and life cycle) Polymorphism in cnidarians. Corals and coral reefs Ctenophora (structure and affinities)</p>	10
III	<p>HELMINTHES AND ANNELIDA Type study: <i>Fasciola hepatica</i> (Structure, reproduction, life cycle and pathogenicity) Parasitic adaptations in helminthes Type study: <i>Ascarislumbricoides</i>(Structure, reproduction, life cycle and pathogenicity) Type study: <i>Hirudinaria</i>(Structure, circulatory, excretory and reproductive systems) Coelom and coelomoducts in annelids</p>	17
IV	<p>ARTHROPODA AND MOLLUSCA Structural affinities of Onychophora Type study: <i>Macrobrachiumrosenbergii</i>(Structure, appendages and Respiratory system) Economic importance of insects (Beneficial – Lac insect, honey bee, <i>Bombyxmori</i>and Lady bird; Harmful – house fly, mosquito, locustand bedbug) Metamorphosis in insects Study of Pearl Oyster and Pearl Formation Torsion in gastropods</p>	14
V	<p>ECHINODERMATA AND HEMICHORDATA Water-vascular system Echinoderm larvae <i>Balanoglossus</i>- Structure and affinities</p>	6

TEXTBOOKS

1. R.L. Kotpal, *Modern Text Book of Zoology - Invertebrates*.
2. P.S. Dhami and J.K. Dhami *Invertebrate Zoology*.

SUGGESTED READINGS

1. L.H. Hyman, '*The Invertebrates*' Vol I, II and V. – M.C. Graw Hill Company Ltd.
2. Ruppert, Fox and Barnes, *Invertebrate Zoology - A Functional Evolutionary Approach* - Thomas Publishers. Indian Edition.
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. Sedgwick. A. '*A Student Text Book of Zoology*' Vol-I, II and III – Central Book Depot, Allahabad.

CO-CURRICULAR ACTIVITIES

- Preparation of chart/model of *Elphidium* life cycle
- Visit to Zoology museum or Coral island as part of Zoological tour
- Charts on life cycle of *Obelia*, polymorphism, sponge spicules
- Clay models of canal system in sponges
- Preparation of charts on life cycles of *Fasciola* and *Ascaris*
- Visit to adopted village and conducting awareness campaign on diseases, to people as part of Social Responsibility.
- Plaster-of-Paris or Thermocol model of *Peripatus*
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Models of compound eye, bee hive and termitarium (termitaria) by students
- Visit to apiculture centre and short-term training as part of apprenticeship programme of the govt. of Andhra Pradesh
- Chart on pearl forming layers using clay or Thermocol
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Phylogeny chart on echinoderm larvae and their evolutionary significance
- Preparation of charts depicting the feeding mechanism, 3 coeloms, tornaria larva etc., of *Balanoglossus*

I SEMESTER END EXAMINATIONS

PAPER – I MODEL PAPER *Cours Code: ZOOT11A*

Title of the paper: Animal Diversity Biology of Non – Chordates

Time: 3 Hours

Max. Marks: 75

SECTION –A

Draw neat labeled diagrams wherever necessary.

Answer and FIVE of the following

5x5=25 Marks

1. Describe the structure of *Polystomella* CO 1, L1
2. List out/state the different types of cells in sponges CO1, L1
3. Describe *Obelia* medusa CO1, L1
4. Describe Flame cells in *Fasciola hepatica* CO1, L1
5. Explain the significance of coelom in annelids CO2, L2
6. Explain bipinnaria larva in relation to phylogeny CO3, L2
7. Explain the process of pearl formation and its significance CO5, L2
8. *Peripatus* is a connecting link. Analyze. CO4, L4

SECTION – B

Answer the following questions.

5X10=50 Marks

9. Explain the different types of nutrition in protozoans. CO5, L2
OR
Explain the different types of canal system in sponges. CO5, L2
10. Evaluate the process of metagenesis in the life cycle of *Obelia*. CO1, L5
OR
Evaluate how ctenophores differ structurally from cnidarians. CO1, L5
11. Describe the life cycle of *Ascaris lumbricoides*. CO2, L2
OR
Describe the reproductive system of *Hirudinaria*. CO2, L2
12. Enumerate the economic importance of insects CO3, L1
OR
Describe torsion in gastropods as significant in larval development CO3, L1
13. Analyze the functional suitability of water vascular system in echinoderms CO5, L4
OR
Examine the structural affinities of *Balanoglossus*. CO4, L4

PRACTICAL- I (At the end of I Semester)

Title of the paper: Animal Diversity Biology of Non – Chordates

No of Hours: 30

Credits: 01

WEF: 2021-2022 Course Code: ZOO P11A

LEARNING OUTCOMES:

By the end of the course students will be able to

1. Understand the general characters and classification from Protozoa to Hemichordata
2. Understand the importance of preservation of museum specimens
3. Identify animals based on special identifying characters
4. Understand different organ systems through demo or virtual dissections
5. Maintain a neat, labeled record of identified museum specimens
6. Exhibit the hidden creative talent

COURSE OUTCOMES

CO1 To identify the characteristics and systematic position of protozoans and poriferans PO1, PO2, PO5, PO6, PO7, PSO1

CO2 To identify the characteristics and systematic position of Cnidarians and Helmenthes. PO1, PO2, PO5, PO6, PO7, PSO1

CO3 To identify the characteristics and systematic position of Annelids, Arthropodans and Molluscans. PO1, PO2, PO5, PO6, PO7, PSO1

CO4 To identify the characteristics and systematic position of Echinoderms and hemichordates. PO1, PO2, PO5, PO6, PO7, PSO1

CO5 To understand the various systems of Prawn by Dissecting and Mounting its appendages. PO1, PO2, PO5, PO6, PO7, PSO1

Syllabus
Course Details

Unit	Learning Units
Syllabus	General characters and classification of the following phyla and sub-phyla up to classes with suitable examples: Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata and Hemichordata.
I	<p>SPOTTERS Porifera: <i>Euspongia</i>, <i>Spongilla</i>, <i>Sycon</i>. Cnidaria: <i>Physalia</i>, <i>Velella</i>, <i>Aurelia</i>, <i>Gorgonia</i>, <i>Pennatula</i>. Annelida: <i>Nereis</i>, <i>Heteronereis</i>, <i>Aphrodite</i>, <i>Hirudineria</i>. Arthropoda: <i>Scylla</i>, <i>Macrobrachium</i>, <i>Scolopendra</i>, <i>Sacculina</i>, <i>Limulus</i>, <i>Scorpion</i>, <i>Peripatus</i>. Mollusca: <i>Chiton</i>, <i>Murex</i>, <i>Unio</i>, <i>Sepia</i>, <i>Loligo</i>, <i>Octopus</i>, <i>Nautilus</i>. Echinodermata: <i>Asterias</i>, <i>Ophiothrix</i>, <i>Echinus</i>, <i>Clypeaster</i>, <i>Cucumaria</i>, <i>Antedon</i>. Hemichordata: <i>Balanoglossus</i></p>
II	<p>SLIDES Protozoa: <i>Elphidium</i>, <i>Paramoecium</i>, <i>Paramoecium</i> - Binary fission and conjugation, <i>Vorticella</i>, <i>Entamoebahistolytica</i>, <i>Plasmodium vivax</i> Porifera: T.S and L.S. of <i>Sycon</i>, spicules, gemmule Cnidaria: <i>Obeliacolony</i> and medusa, Platyhelminthes: <i>Planaria</i>, <i>Fasciola hepatica</i>, <i>Fasciolalarval</i> forms (Miracidium, Redia, Cercaria) <i>Echinococcusgranulosus</i>, <i>Taeniasolium</i> Nematoda: <i>Ascarislumbricoides</i> (male and female), <i>Ancylostomaduodenale</i> (male and female), <i>Dracunculus</i>, <i>Wuchereria</i> Annelida: Trochophore larva Arthropoda: Mouthparts of housefly, butter fly, male and female <i>Anopheles</i> and <i>Culex</i>, Crustacean larvae (nauplius, mysis, zoea) Mollusca: Glochidium larva Echinodermata: Bipinnarialarva Hemichordata: Tornaria larva</p>
III	<p>DEMONSTRATION OF DISSECTIONS 1. Prawn: Nervous system Mounting of statocyst Mounting of appendages 2. Mounting of Insect mouth parts • Animal Album to be submitted at the time of practical examination • Laboratory Record Book to be submitted at the time of practical examination</p>

Suggested Manuals

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

I B.Sc. ZOOLOGY PRACTICAL EXAMINATION

Practical - I

Course Code: ZOO P11A

Title of the paper: Animal Diversity Biology of Non – Chordates

Time: 3hrs.

Max. Marks 40M

-
1. List out the general characters of Phylum ----- . CO1 L1 3 M
2. Identify and draw a neat labeled diagram of nervous system/appendages of prawn. 7 M
CO 4 L3 Identification: 1 M
Diagram: 4 M
Labeling: 2 M
2. Prepare a neat mount of statocyst/ mouth parts of cockroach. 5 M
CO4 L3 Mounting: 2 M
Diagram: 1 M
Labeling: 2 M
3. Identify, draw a labeled diagram, classify and write notes on A, B, C, D and E
CO3 L2 5 X 3 = 15 M
A. Protozoa & Porifera
B. Cnidaria & Platyhelminthes
C. Nematoda & Annelida
D. Arthropoda
E. Mollusca, Echinodermata & Hemichordata
- Identification: 1 M
Diagram: ½ M
Classification: ½ M
Comments: 1 M
4. Practical Record Book CO5 L3 5 M
5. VIVA CO6 L5 5M

Total Marks :- 40M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NACC reaccredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Cell Biology, Genetics, Molecular Biology & Evolution**

Semester: - III

Course Code	ZOO-301	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

Course Outcomes:

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell Biology, Animal Biotechnology and Evolution and by the completion of the course the graduate shall be able to–

- CO1 To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- CO2 Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- CO3 To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
- CO4 Acquiring in-depth knowledge on various aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders
- CO5 Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
- CO6 Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

Learning Objectives

- To understand the origin of cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities
- To provide the history and basic concepts of heredity, variations and gene interaction
- To enable the students distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance.
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with coordinated functioning of replication, transcription and translation in all living beings
- To provide knowledge on origin of life, theories and forces of evolution
- To understand the role of variations and mutations in evolution of organisms

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Unit-I Cell Biology Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma Electron microscopic structure of animal cell. Plasma membrane – Models and transport functions of plasma membrane. Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes (Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin Structure and Functions with suitable diagrams) 2. Need not study cellular respiration under mitochondrial functions)</p>	10
II	<p>Unit-II Genetics –I Mendel's work on transmission of traits Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination) Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)</p>	13
III	<p>Unit-III Genetics –II Mutations & Mutagenesis Chromosomal Disorders (Autosomal and Allosomal) Human Genetics – Karyotyping, Pedigree Analysis (basics) Basics on Genomics and Proteomics</p>	10
IV	<p>UNIT IV: Molecular Biology Central Dogma of Molecular Biology Basic concepts of – a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork) b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics) c. Translation – Initiation, Elongation and Termination Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes</p>	15
V	<p>Unit-V Origin of life Theories of Evolution: Lamarckism, Darwinism, Germ Plasm Theory, Mutation Theory. Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium. Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, and Speciation.</p>	12

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Dt. A.P. (Autonomous)**

Semester III w.e.f. 2021-2022

(Model question paper)

Title of the paper: Cell Biology, Genetics, Molecular Biology & Evolution

Code – ZOO-301C

Time: 3hrs.

max.marks: 70

Section – A

4 x 5 = 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

1. Golgicomplex
2. Nucleus,
3. LethalGenes
4. Sexdetermination
5. Mutations
6. Proteomics
7. Semi-conservativemechanism
8. Hardy-WeinbergEquilibrium

Section – B 5 x 10 = 50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labeled diagrams wherever necessary.

9. Explain the Models and transport functions of Plasmamembrane?
10. Structure and functions of Mitochondria?
11. Explain about Sex linked inheritance?
12. Give an account of Chromosomal Disorders?
13. Explain about Translation?
14. Write an essay on Gene Expression in prokaryotes?
15. Explain about theory of Lamarckism & Darwinism?
16. Write an essay on Speciation?

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Krishna Dt. A.P. (Autonomous)**

Semester -III

Guide

lines to the Paper Setter.

W.e.f. 2021-

2022 Title of the paper: Cell Biology, Genetics, Molecular Biology & Evolution

Code – ZOO-301C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A. Each question carries five marks. $4 \times 5 = 20M$.

2. Answer any **five** questions out of eight in Section – B. Each question carries Ten marks. $5 \times 10 = 50M$.

	Section	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	1	1	2	2
Weightage		30	25	20	25	25

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be in English medium.

REFERENCES:

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Freeman and company New York.
2. Cell Biology by De Robertis
3. Bruce Alberts, Molecular Biology of the Cell
4. Rastogi, Cytology
5. Varma & Aggarwal, Cell Biology
6. C.B. Pawar, Cell Biology
7. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
11. 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.
12. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
13. Molecular Biology by Freifelder
14. Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited
15. Hall, B. K. and Hallgrímsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
16. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
17. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
18. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
19. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
20. Jan M. Savage. Evolution, 2nd ed., Oxford and IBH Publishing Co., New Delhi.
21. Gupta P.K., 'Genetics

PRACTICAL – III

Code: ZOO- 301P

w.e.f. 2021-2022

MAX.MARKS: 50.

(2hrs/week)

**Cell Biology, Genetics, Molecular Biology & Evolution
PRACTICAL SYLLABUS**

Learning Objectives:

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny and geological history of origin & evolution of animals

Syllabus

Course Details

Unit	Learning Units
I	I. Cell Biology 1. Preparation of temporary slides of Mitotic divisions with onion root tips 2. Observation of various stages of Mitosis and Meiosis with prepared slides 3. Mounting of salivary gland chromosomes of <i>Chironomus</i>
II	II. Genetics 1. Study of Mendelian inheritance using suitable examples and problems 2. Problems on blood group inheritance and sex linked inheritance 3. Study of human karyotypes (Down's syndrome, Edwards syndrome, Patau syndrome, Turner's syndrome and Klinefelter syndrome)
III	III. Evolution 1. Study of fossil evidences 2. Study of homology and analogy from suitable specimens and pictures 3. Phylogeny of horse with pictures 4. Study of Genetic Drift by using examples of Darwin's finches (pictures) 5. Visit to Natural History Museum and submission of report

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A.P. (AUTONOMOUS)
PAPER – III
(Cell Biology, Genetics, Molecular Biology & Evolution)**

w.e.f.2021-22.

Model Question paper (External)Max.Marks: 25 M.

Paper Code: ZOO-301P

I. Cell Biology

1. Identify, draw neat labeled diagram & notes of the following stages. 2x2 ½= 5M.
A & B

II. Genetics

- 1.Genetics Problem. 5M.
2. Identify the following Chromosomes & Comment. 2x2 ½= 5M.
A & B

III. Evolution

1. Identify the given pictures and write the Comment. 2x2 ½= 5M
A & B
2. Identify the given pictures and Comment. 2x2 ½= 5M
A & B

**A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-521165
ZOOLOGY PRACTICAL -III**

**(INTERNAL)
w.e.f. 2021-2022.**

(2hrs/week).

**Cell Biology, Genetics, Molecular Biology & Evolution
Code: ZOO-301P.**

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 5M.
2. Record ----- 10M.
3. Field trip & Field note book -----10M.

Total ----- 25M.

A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)
PAPER – III

Guide lines for the practical Examiner

W.e.f.2021-2022

Class: II B.Z.C

Paper Title: **(Cell Biology, Genetics, Molecular Biology & Evolution)**

Paper Code: ZOO-301P

Max.Marks: 25 M.

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I.Cytology

1. Slide A from Mitosis & Slide B Meiosis. $2 \times 2 \frac{1}{2} = 5M.$
($\frac{1}{2}$ mark for identification, 1 mark for labeled diagram & 1 mark for comments)

II.Genetics

2. Checker board 2M.
Explanation 3M.
3. Identify & Comment on A& B (From Chromosomes). $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2} M$
B-Identification – 1 M, Comment – $1 \frac{1}{2} M$

III.Evolution

4. Identify & Comment on A& B(A- fossil evidence, B – Homology & Analogy) $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2} M$
B-Identification – 1 M, Comment – $1 \frac{1}{2} M$
5. Identify & Comment on A& B (A- Phylogeny of Horse, B – Darwin's Finches) $2 \times 2 \frac{1}{2} = 5M$
A-Identification – 1 M, Comment – $1 \frac{1}{2} M$
B-Identification – 1 M, Comment – $1 \frac{1}{2} M$

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NACC reaccredited at 'A' level
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Title of the Paper: Animal Biotechnology

Semester: - V

Course Code	ZOO-501	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

Objective of the course: To educate students on various biotechnological techniques involve in animal biotechnology, gene manipulations, their role in production of medicines and transgenic animals.

Course outcomes:

CO1 Students are made to become aware of the use of technology that is involved in cloning.

CO2 Improved quality of species with gene manipulations

CO3 Recent development in biotechnology that helps for better environment and
Production of various monoclonal antibodies and vaccines.

CO4 Formation of different species - transgenic animals

CO5 Resistant variety and better yield

Learning Objectives

- To understand the natural function of Restriction enzymes and explained how they are used in r-DNA technology.
- To understand the features & Types of cloning vectors.
- Purposes and applications of r-DNA techniques.
- To understand uses of DNA probes.
To understand gene transfer technologies for animals and animal cell lines.
- Explain how the creation of sticky ends by restriction enzymes in use full in producing a r-DNA technologies.
- To understand the process of nucleic acid hybridization .

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors Restriction modification systems : Types I, II and III- Nomenclature, Applications of Type II restriction enzymes in genetic engineering ,DNA polymerases, transferase, kinases and phosphatases,and DNA ligases Cloning Vectors: : Properties of Cloning Vectors Plasmid vectors:pBR and pUC 18, Bacteriophage and, Cosmids.Artificial Chromosome Vectors: BACs, YACs</p>	15
II	<p>Unit 2: Techniques of Recombinant DNA technology Cloning: Procedure of gene cloning, Use of linkers and adaptors. Microinjection, electroporation, biolistic method (gene gun). PCR:- Basics of PCR, Principle and Procedure of PCR. DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing. Southern, Northern and Western blotting. DNA finger printing,</p>	15
III	<p>UNIT 3 Animal Cell Technology Cell culture media: Natural and Synthetic, Types Cell cultures-: primary culture, secondary culture. Continuous cell lines , Established Cell lines (common examples such as MRC, HeLa,CHO, BHK,) Cryopreservation of cultures, Hybridoma Technology:- Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb Stem cells: Types of stem cells- Embryonic and Adult Stem Cells, Diabetes and Parkinson's diseases.</p>	10
IV	<p>Unit 4: Reproductive Technologies & Transgenic Animals Manipulation of reproduction in animals, Artificial Insemination, <i>In vitro</i> fertilization. Super ovulation, Embryo transfer, Embryo cloning. Transgenic Animals- Production of Transgenic Animals- sheep, fish.</p>	10
V	<p>Unit 5: Applied Biotechnology Industry: Fermentation- Different types of Fermentation. Submerged & Solid state, batch, Fed batch & Continuous (Short notes only) Downstream processing - Filtration, centrifugation, chromatography, spray drying , Fisheries: Polyploidy in fishes.</p>	10

SEMESTER-V (Model Question paper)

w.e.f.- 2021-2022. *Paper*

Title:Animal Biotechnology.

Paper Code: ZOO 501C

Time: 3 hrs.

Max.Marks:70

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Part – A

Answer **any FOUR** questions out of eight in Part - A. Each question carries five marks. **4 X 5 = 20**

Part – B

- 1.Ligases
- 2.YAC
- 3.Southern Blotting
- 4.DNA Fingerprinting
- 5.Applications of mAb
- 6.Polyploidy in fishes
- 7.Invivo fertilization
- 8.Chromatography

Part – B

Answer **any FIVE** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on cloning vectors.
10. Explain the role of Type II Restriction enzymes in genetic engineering.
11. Define gene cloning .Describe the procedure of gene cloning in detail.
12. What is PCR. Briefly describe various steps of PCR.
13. Define Stem Cell Technology ? Briefly describe about it.
14. Write in detail about the transgenic animals.
15. Write an essay on different types of fermentation.
16. Briefly describe the technology of super ovulation and Embryo transfer in cattle's and discuss their applications and limitations.

SEMESTER-V

Time: 3 hrs

Max.Marks:70

Guide lines to the paper setter

Paper Title: Animal Biotechnology

Paper Code: ZOO -501C

*Note:*1. Answer **any FOUR** questions out of eight in Part-A . Each question carries five marks. 4X 5 = 20M.

2. Answer any **FIVE** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	25	20

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

Reference Books:-

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing , Oxford,U.K
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. ElsevierAcademic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

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ZOOLOGY PRACTICAL SYLLABUS

PAPER - V

Periods: 30 Code: ZOO-501P

Credits :2 Paper Title : Animal Biotechnology

Max.Marks:50

Unit	Learning Units
SYLLABUS	1. Genomic DNA isolation from <i>E. coli</i> .
	2. Plasmid DNA isolation (pUC 18/19) from <i>E. coli</i>
	3. Study the following techniques through photographs. a. Southern blotting. b. Western blotting. c. DNA sequencing (Sanger's method) d. DNA finger printing
	4.. PCR (demonstration) on site or of site demonstration
	5. Project report on animal cell culture

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Practical - V *w.e.f. 2021- 22*
(Animal Biotechnology) *Max. Marks: 25*
Model Question Paper (External) *Paper Code: ZOO-501P*

-
1. Identify the following Genomic DNA isolation from *E. coli*. 5m
 2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli*. 5m
 3. Study the following techniques given on photographs & Write notes on 2x5=10
A & B
 4. PCR (demonstration) on site or of site demonstration. 5m
- Total: 25m

Guide lines for the Practical Examiners.

Class: III B.Z.C

Paper Title: Animal Biotechnology.

Max.Marks: 25 M.

W.e.f.2021-22.

Paper Code: ZOO-501C

1. Identify the following Genomic DNA isolation from *E. coli*.
(5 marks for Procedure)
2. Identify the following Plasmid DNA isolation (pUC 18/19) from *E. coli* .
(5 marks for Procedure)
3. Study the following techniques given on photographs & Write notes on A & B.
(1 mark for identification & 4 marks for diagram and notes, for each photographs)
4. PCR (demonstration) on site or of site demonstration.
(5 marks for PCR demonstration)

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Practical – V
(Animal Biotechnology)
Model Question Paper (Internal)

w.e.f. 2021-22
Max. Marks: 25
Paper Code: ZOO-501P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book	--	10M
	Total --	25M

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Title of the Paper: Animal Husbandry

Semester: - V

Course Code	ZOO-502	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

Objective of the course: To help students to stand on their own legs, acquire skills in poultry and Dairy farms and to set up their own firms.

Course outcomes:

CO1; Students are given awareness about different varieties of chicks.

CO2: Students are familiarized with recent technologies those are applied to produce different species with variations which are more beneficial and income fetching.

CO3: Students with the help of self help schemes, can set up their own firms, and provide

CO4: Employability to others and to tap the resources of Government and Non governmental sectors.

CO5: They are given managerial and marketing skills as well.

Learning Objectives

- To understand production of milk, meat, egg and other animal bi – products.
- To understand delivery of necessary livestock health care through timely immunization against total diseases, proper diagnosis and rational treatment for optimization of livestock production.
- To understand fulfil the objective of protein enriched quality food requirement of the growing population of the country and prevent malnutrition in one the highest malnourished children population in the world.
- To understand principles of feeding and nutrient requirements for different stages of layers and broilers.
- To make available quality concentrated animals feed to the cattle, buffalo, sheep and poultry to provide balanced ration at affordable prices.

Syllabus

Course details

Unit	Learning Units	Lecture Hours
I	UNIT – I: General introduction to poultry farming, Principles of poultry housing. Poultryhouses. Systems of poultry farming. Management of chicks, growers, layers, and Broilers.	10
II	UNIT – II: Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers. Methods of feeding- Whole grain feeding system, Grain and mash method, All mash method, Pellet feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.	10
III	UNIT – III: Selection, care and handling of hatching eggs, Egg testing. Methods of hatching. Brooding and rearing, Sexing of chicks.	10
IV	UNIT- IV: Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. Systems of inbreeding and crossbreeding. Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn.	20
V	UNIT - V: Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks. Cleaning and sanitation of programme. Records to be maintained in a dairy farm.	10

SEMESTER-V (Model Question paper)

Time: 3 hrs Paper Code: Zoo-502C

Paper Title: Animal Husbandry Max.Marks:70

Part – A

Answer **any FOUR** questions out of eight in Part - A . Each question carries five marks. **4 X 5 = 20**

1. Principles of poultry farming.
2. Chick management.
3. Poultry feed management.
4. Marek's disease.
5. Egg testing (Candle test)
6. Cleaning and sanitation of Dairy farm.
7. Milk record register
8. Loose housing system

Part – B

Answer **any five** questions out of eight in Part - B .Each question carries Ten marks. **5 X 10 = 50**

9. Write an essay on systems of poultry farming
10. Write an essay on management of Broilers
11. Write an essay on symptoms control and management of two viral and bacterial diseases.
12. Write an essay on methods of feeding in Poultry
13. Write an essay on different methods of hatching eggs
14. Give an account of breeds of Indian Cows
15. Explain the vaccination programme in Cattle
16. Write an essay on care and management of Calf, heifer and milk animals

SEMESTER-V

Time: 3 hrs

Max.Marks:70

Guide lines to the paper setter

Paper Title: Animal Husbandry.

Paper Code: 502C

Note: 1. Answer **any FOUR** questions out of eight in Part-A . Each question carries five marks. 4 X 5 = 20M.

2. Answer any **five** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	2	1
10 Marks Questions	B	2	2	1	2	1
Weightage		30	30	15	30	15

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

Text Books:-

1. Animal Husbandry: ---- Technical Test paper.
2. Poultry- Technical Revised Common Core.
3. Animal Husbandry --- Dr.K.Kondaiah, A.V.N.Gupta.

ZOOLOGY PRACTICAL SYLLABUS

Period: 30

PAPER – VI

Credits:2

Paper Code: Zoo-502P

Paper Title: Animal Husbandry

Max.Marks:50

Unit	Learning Units
SYLLABUS	1. Study of various breeds of layers and broilers (photographs)
	2. Identification of disease causing organisms in poultry birds (as per theory)
	3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
	4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
	5. Study of various breeds of cattle (photographs/microfilms)
	6. Study of various activities carried out in a dairy farm and submission of a report.

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Practical - VI

(Animal Husbandry)

Max. Marks: 50

Model Question Paper (External)

Paper Code: ZOO-502P

1. Study of various breeds of layers and broilers (photographs) A & B	2X2 ¹ / ₂ =5M
2. Identification of disease causing organisms in poultry birds (as per theory) A & B	2X2 ¹ / ₂ =5M
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)	5M
4. Study of various breeds of cattle (photographs/microfilms) A & B	2X5=10M
Total --	25M

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(AUTONOMOUS)**

Guide lines for the Practical Examiners.

Class: III B.Z.C

Paper Title: (Animal Husbandry)

Max.Marks: 25m
Paper Code: ZOO-502C

1. Identify and comment on A & B (Charts / Photographs).
(Identification - $\frac{1}{2}$ mark & Comments -2m)
2. Identify and comment on A & B (Charts / Photographs)
(Identification - $\frac{1}{2}$ mark & Comments -2m)
3. Demonstration: (4 marks for diagram & 1 mark for labeling)
4. Identify and comment on A & B (Photographs/ microfilms).
(Identification -1 mark & Comments -4m)

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Animal Husbandry

Practical - V I
Max. Marks: 50

Model Question Paper (Internal) Paper Code: ZOO-502P

1. Attendance	--	5 M
2. Record	--	10M
3. Field trip & Field note book (Any one)	--	10M

Total -- 25M

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Title of the Paper: Environmental Studies.

Semester: - I

Course Code		Course Delivery Method	Class Room/Blended Mode - Both
Credits	2	CIA Marks	10
No. of Lecture Hours/ Week	10	Semester End Exam Marks	40
Total Number of Lecture Hours	30	Total Marks	50
Year of Introduction : 2021	Year of Offering 2020-2021	Year of Revision – 2021-22	Percentage of Revision: 0%

LIFE SKIL COURSE	CLAC001	2021-2022	B.A., B.Com., A.B.C.,&B.Sc
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CO1: Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.

CO2: Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.

CO3: Discuss the laws/ acts made by government for environmental conservation and acquaint with international agreements and national movements and realize citizen's role in protecting environment and nature.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Unit 1: Environment and Natural Resources Multidisciplinary nature of environmental education. Scope and importance of environmental education. A brief account of forest, water and renewable energy resources. Biodiversity introduction, Levels of Biodiversity: genetic, species and ecosystem diversity. Concept, Structure and functions of an Ecosystem.</p>	8
II	<p>Unit 2 : Environmental degradation and Impacts Threats to Biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control. A brief account of causes and effects of Air, Water, Soil and Noise pollution. Non-renewable energy resources, their utilization and influences. Climate change, Global warming, Acid rains, Ozone depletion. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.</p>	12
III	<p>Unit 3: Conservation of Environment Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Control measures for various types of pollution; use of renewable and alternate sources of energy. Solid waste management- Measures for safe urban and Industrial wastes disposal. Environment Laws: Environment Protection Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols. Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.</p>	10

Suggested activities to learner:

1. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural site.
2. Visit to a local waste disposal/ land filling site

Reference Books :

1. Environmental Studies by Dr.M.Satyanarayana, Dr.M.V.R.K.Narasimhacharyulu, Dr.G. Rambabu and Dr.V.VivekaVardhani, Published by Telugu Academy, Hyderabad.
2. Environmental Studies by R.C.Sharma, Gurbir Sangha, published by Kalyani Publishers.
3. Environmental Studies by Purnima Smarath, published by Kalyani Publishers

MODEL PAPER
AEC002 /HRDMM/

Title of the paper: Environmental Studies.

No. of Pages:-1.

Max. Marks: 40M

Time: 2 Hrs

No. of Questions: 16 Pass min. 16M

SECTION –A

Answer any FOUR of the following:

4x7=28 M

1. Explain the scope and importance of environmental studies?
.
2. Give an account of renewable energy resources?
.
3. Define ecosystem. Explain the structural components of an ecosystem?
.
4. Define biodiversity. Explain various strategies for its conservation?
.
5. Explain the causes, effects and control measures of air pollution?
.
6. Give an account on environmental acts?

SECTION –B

Answer any SIX of the following:

6x2=12 M

7. Deforestation.
8. Chipko movement
9. Food chain
10. Biodiversity Hotspots
11. Poaching
12. Floods
13. Earthquakes
14. Rainwater harvesting
15. Global warming
16. Population explosion

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NACC reaccredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Poultry Farming**

Semester: - III

Course Code	PF-301	Course Delivery Method	Class Room/Blended Mode - Both
Credits	2	CIA Marks	00
No. of Lecture Hours/ Week	10	Semester End Exam Marks	50
Total Number of Lecture Hours	30	Total Marks	50
Year of Introduction :	Year of Offering 2020-2021	Year of Revision – 2021-22	Percentage of Revision: 0%

SKILL DEVELOPMENT COURSE	Course code: PF-301	2021-2022	A.B.C., & B.Sc
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Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and its role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Section I (Introduction to Poultry Farming): General introduction to poultry farming -Definition of Poultry; past and present scenario of poultry industry in India. Principles of poultry housing. Poultry houses. Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers. Preparation of project report for banking and insurance</p>	10
II	<p>Section II (Feed and Livestock Health Management): Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management; Vaccination programme.</p>	10
III	<p>Section III (Harvesting of Eggs and Sanitation): Selection, care and handling of hatching eggs. Egg testing .Methods of hatching. Brooding and rearing. Sexing of chicks. Farm and Water Hygiene, Recycling of poultry waste.</p>	10

Co- Curricular Activities suggested:

(4 Hrs)

1. Group discussion & SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online Swayam Moocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"

Semester –III

w.e.f. 2021-2022 Time: 90 mins (Model question paper)

Title of the paper: Poultry Farming. Code – PF- 301(SDC)

max.marks: 50

Section – A

Answer any **four** questions. Each question carries **five** marks. $4 \times 5 = 20$.

1. Poultry house
2. Broilers
3. Any two viral diseases of poultry
4. Any two bacterial diseases of poultry
5. Any two fungal diseases of poultry
6. Egg testing
7. Brooding
8. Sexing chicks

Section – B

Answer any **three** questions. Each question carries **Ten** marks. $3 \times 10 = 30$

9. Discuss briefly the past, present and future scenario of poultry farming industry in India
10. Explain principles of poultry housing in detail, with examples.
11. Write an essay on viral diseases of poultry.
12. Give an account of fungal and bacterial diseases (any two each) of poultry
13. Write an essay on selection, handling and hatching of eggs.

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(AUTONOMOUS)

**SEMESTER-III
SKILL DEVELOPMENT COURSE**

Guide lines to the paper setter

Time: 1¹/₂ hrs

Max.Marks:50

Paper Title: - Poultry Farming.

Paper Code: PF-301 (SDC)

*Note:*1. Answer **any four** questions out of eight in Part-A. Each question carries five marks.4X 5 = 20M.

2. Answer any**three** questions out of five in Part-B. Each question carries 10 marks.3 X 10 = 30M.

	PART	Unit –I	Unit – II	Unit-III
5 Marks Questions	A	2	3	3
10 Marks Questions	B	2	2	1
Weightage		30	35	25

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

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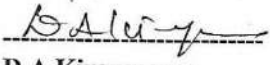
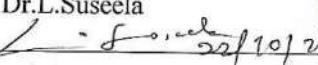
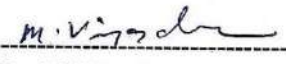


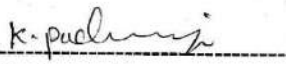
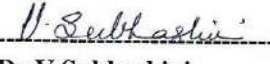

**Accredited by NAAC with “A” Grade
2022-23**



**DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES
ODD SEMESTER
22-10-2022**



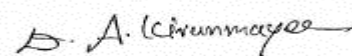
Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 3:00 pm on 22-10-2022 in the Department of Zoology.

S.No	Name	Designation	signature
1.	Smt. D.A.Kiranmayee Head, Department of Zoology A.G&S.G.S Degree College Vuyyuru	Chair person	 D.A.Kiranmayee
2	Smt. Dr.L.Suseela Bio Sciences & Bio technology Krishna University Machilipatnam.	University Nominee	----- Dr.L.Suseela  22/10/22
3.	Sri Dr.M.Vijay kumar Head, Department of Zoology SRR & CVR Govt. Degree College, Vijayawada.	Subject Expert	 Dr.M.Vijay kumar
4.	Sri Ch. Venkateswaralu, Head, Department of Zoology, P.B. Siddhartha College, Vijayawada.	Subject Expert	 Ch. Venkateswaralu,
5.	Sri.B. Appala Naidu, Asst. Project Manager, RGCA Manikonda.	Industrialist	 B. Appala Naidu,
6.	Smt. K. Padmaja, Lecturer in Zoology, A.G&S.G.S Degree College Vuyyuru-	Member	 K. Padmaja,
7	Smt. Dr.V.Subhashini, Lecturer in Zoology, A.G & S.G.S Degree College Vuyyuru-	Member	 Dr.V.Subhashini
8	Sri.Ch.Chiranjeevi, P.hd –Research Scholar, Dept.of Botany & Microbiology, Acharya Nagarjuna University Guntur.	Student Represent	 Ch.Chiranjeevi,

ZOOLOGY

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for I Semester of IB.Sc (B.Z.C) for the academic year 2022 - 2023.
2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II B.Sc (B.Z.C) for the academic year 2022 - 2023.
3. To introduce Skill enhancement course the syllabi (Theory & Practical), Model question paper for VSemester of IIIB.Sc (B.Z.C) for the academic year 2022 - 2023.
4. To recommend the Blue print for the semester end exam for I, III & V semester of I, II, III B.Sc (B.Z.C) for the academic year 2022 - 2023.
5. To introduce LifeSkill Course – Health and Hygiene for II year students in this academic year 2022-23.
6. To introduce Value added course (Theory, Model question paper) for VSemester of III B.Sc(B.Z.C) for the academic year 2022 - 2023.
7. To recommend the teaching and evaluation methods to be followed under Autonomusstatus.
8. Any other matter.



Chairman.

ZOOLOGY- RESOLUTIONS

1. It is resolved to continue the same syllabi (Theory & Practical), model question paper & guide lines to be followed by the question paper setters of Zoology of I semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS) approved by the Academic Council of 2022 – 2023.

2. It is resolved to follow the changed syllabi (Theory & Practical), model question paper & guide lines to be followed by the question papers under Choice Based Credit System (CBCS) setters of Zoology of III Semester of II B.Sc. (B.Z.C) for approval by the Academic Council of 2022 –2023. The new paper introduced is Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour

3. It is resolved to implement the new syllabi & model papers under Choice Based Credit System (CBCS) of Zoology of V semester SEC – 6 (Sustainable Aquaculture Management) and SEC – 7A(Postharvest Technology of fish and Fisheries) of III B.Sc. (B.Z.C) approved by the Academic Council of 2022-2023.

4. It is resolved to continue the same Blue prints of I, III, & V Semesters of B.Sc Zoology for the Academic year 2022-2023.

5. It is resolved to implement Life Skill Course for II-year students. of III SEM

6. It is resolved to implement Value added Course for III-year students of V SEM

7. It is resolved to continue the following teaching & evaluation methods for the year 2022-23.

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

Evaluation of a student is done by the following procedure:

❖ Internal Assessment Examination:

- ❖ Out of maximum 100 marks in each paper for I, II B.Sc, 30 marks shall be allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for I, III B.SC.
- ❖ Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment.
- ❖ Out of these 25 marks, 15 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated on assignment and remaining 5 marks seminar for III semester. There is no pass minimum for internal assessment for I, II, III B.Sc.

❖ Semester – End Examination:

- ❖ The maximum mark for I&III (BZC) semester – End examination shall be 70 marks and duration of the examination shall be 3 hours.
- ❖ The maximum mark for II B.Sc semester- End examination shall be 75 marks and duration of the examination shall be 3 hours. Even through the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”
- ❖ Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, III, & V semester for I, II & III B.Sc.
- ❖ Discussed and recommended for organizing Value added course, Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.

A. C. Srinivasan

❖
❖ Chairman

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF
ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

ALLOCATION OF CREDITS

<i>Year</i>	<i>Semester</i>	<i>Title</i>	<i>Teaching hours</i>	<i>Internal marks</i>	<i>External marks</i>	<i>Credits</i>	
I	I	Animal Diversity - I Biology of Non-Chordates	4	25	75	03	
		Animal Diversity -Biology of Non-Chordates - Practical - I	2	10	40	02	
II	III	Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour	4	25	75	03	
		Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour Practical - III	2	10	40	02	
	III	Health and Hygiene	2	10	40	02	
III	SEC- 6(A) V(501)	SUSTAINABLE AQUACULTURE MANAGEMENT	3	30	70	03	
		Practical - 501p SUSTAINABLE AQUACULTURE MANAGEMENT	3	25	25	02	
	SEC- 7(A) V(502)	POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES	3	30	70	03	
		Practical - 502p POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES	3	25	25	02	
		6B LIVE STOCK MANAGEMENT-I (BIOLOGY OF DAIRY ANIMALS	3	30	70	3	
			Practical paper-6B Biology of Dairy Animals	3	25	25	2
			7B LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT)	3	30	70	3
			Practical paper-7B Dairy products and management	3	25	25	2
			POULTRY MANAGEMENT- I (POULTRY FARMING)	3	30	70	3
		POULTRY MANAGEMENT- II (POULTRY PRODUCTION AND MANGEMENT	3	25	25	2	

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Title of the Paper: **Animal Diversity Biology of Non – Chordates**

Semester: - I

Course Code	ZOOT11A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: 2021-22	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

AIM

- To know the biodiversity of invertebrates

LEARNING OBJECTIVES

- To understand the structural organization of animals from Protozoa to Hemichordate
 - To understand the evolutionary relationship of different phyla from Protozoa to Hemichordate
 - To understand the specific phenomena exhibited by different groups of invertebrates from Protozoa to Hemichordate
 - To understand the taxonomic position and affinities of certain groups of invertebrates
- AsConnecting links
- To study the life cycles, and pathogenicity of certain

PREREQUISITE

- Knowledge of invertebrates acquired in Intermediate

COURSE OUTCOMES

By the end of the course students will be able to

CO 1 Gain knowledge in the fundamental concepts underlying the structural complexity in the organization of invertebrates.

CO 2 Understand biology and pathogenicity of parasites and their adaptations analyse remedial and preventive measures and promote the same in public domain.

CO 3 Appreciate and evaluate the economic, commercial, medicinal and culture importance of invertebrates and their larval stages in relation to phylogeny

CO 4 Describe the significance of connecting links in understanding the concept of evolution

CO 5 Explain the significance of specific phenomena in different group's of invertebrates in relation to their adaptability for survival

CO 6 Comprehend the systems biology of individual phyla with a specific type study and understand the origin and evolutionary relationship of different phyla and appreciate the uniqueness of individual phyla.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p><i>PROTOZOA AND PORIFERA</i> Introduction to Non-chordates – Origin of metazoans Type study: <i>Polystomella</i>(structure and life cycle) Locomotion in protozoans Nutrition in protozoans Type study: <i>Sycon</i>(Structure, histology and skeleton) Canal system in sponges</p>	13
II	<p><i>CNIDARIA AND CTENOPHORA</i> Type study: <i>Obelia</i>. (Structure – polyp and medusa and life cycle) Polymorphism in cnidarians. Corals and coral reefs Ctenophora (structure and affinities)</p>	10
III	<p><i>HELMINTHES AND ANNELIDA</i> Type study: <i>Fasciola hepatica</i> (Structure, reproduction, life cycle and pathogenicity) Parasitic adaptations in helminthes Type study: <i>Ascarislumbricoides</i>(Structure, reproduction, life cycle and pathogenicity) Type study: <i>Hirudineria</i>(Structure, circulatory, excretory and reproductive systems) Coelom and coelomoducts in annelids</p>	17
IV	<p><i>ARTHROPODA AND MOLLUSCA</i> Structural affinities of Onycophora Type study: <i>Macrobrachiumrosenbergii</i>(Structure, appendages and Respiratory system) Economic importance of insects (Beneficial – Lac insect, honey bee, <i>Bombyxmori</i>and Lady bird; Harmful – house fly, mosquito, locustand bedbug) Metamorphosis in insects Study of Pearl Oyster and Pearl Formation Torsion in gastropods</p>	14
V	<p><i>ECHINODERMATA AND HEMICHORDATA</i> Water-vascular system Echinoderm larvae <i>Balanoglossus</i>- Structure and affinities</p>	6

TEXTBOOKS

1. R.L. Kotpal, *Modern Text Book of Zoology - Invertebrates*.
2. P.S. Dhama and J.K. Dhama *Invertebrate Zoology*.

SUGGESTED READINGS

1. L.H. Hyman, '*The Invertebrates*' Vol I, II and V. – M.C. Graw Hill Company Ltd.
2. Ruppert, Fox and Barnes, *Invertebrate Zoology - A Functional Evolutionary Approach* - Thomas Publishers. Indian Edition.
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. Sedgwick. A. '*A Student Text Book of Zoology*' Vol-I, II and III – Central Book Depot, Allahabad.
7. Parker.T.J. & Haswell '*A Text Book of Zoology*' by, W.A., Mac Millan Co. London.

CO-CURRICULAR ACTIVITIES

- Preparation of chart/model of *Elphidium* life cycle
- Visit to Zoology museum or Coral island as part of Zoological tour
- Charts on life cycle of *Obelia*, polymorphism, sponge spicules
- Clay models of canal system in sponges
- Preparation of charts on life cycles of *Fasciola* and *Ascaris*
- Visit to adopted village and conducting awareness campaign on diseases, to people as part of Social Responsibility.
- Plaster-of-Paris or Thermocol model of *Peripatus*
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Models of compound eye, bee hive and termitarium (termitaria) by students
- Visit to apiculture centre and short-term training as part of apprenticeship programme of the govt. of Andhra Pradesh
- Chart on pearl forming layers using clay or Thermocol
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Phylogeny chart on echinoderm larvae and their evolutionary significance
- Preparation of charts depicting the feeding mechanism, 3 coeloms, tornaria larva etc., of *Balanoglossus*

I SEMESTER END EXAMINATIONS

PAPER – I MODEL PAPER Cours Code: ZOOTO11A

Title of the paper: Animal Diversity Biology of Non – Chordates
(W.E.F 2022-2023)

Time: 3 Hours

Max. Marks: 70

Answer ALL the following questions 5X14=70m

1. a) Explain the different types of nutrition in protozoans. 10M CO5, L2
b) Describe the structure of Polystomella 4M CO 1, L1
OR
c) Explain the different types of canal system in sponges 10M CO5, L2
d) List out the different types of cells in sponges 4M CO1, L1
2. a) Evaluate the process of metagenesis in the life cycle of *Obelia*. 10M CO1, L5
(b) Describe *Obelia* medusa 4M CO1, L1
OR
c) Evaluate how ctenophores differ structurally from cnidarians. 10M CO1, L5
d) Describe Corals and coral reefs 4M CO1, L1
3. (a) Describe the life cycle of *Ascaris lumbricoides*. 10M CO2, L2
(b) Explain the significance of coelom in annelids 4M CO2, L2
OR
c) Describe the reproductive system of *Hirudinaria*. 10M CO2, L2
d) Explain the Flame cells in *Fasciola hepatica* 4M CO3, L2
4. a) Enumerate the economic importance of insects 10M CO3, L1
b) Explain the process of pearl formation and its significance 4M CO5, L2
OR
c). Describe torsion in gastropods as significant in larval development 10M CO3, L1
d). Structural affinities of Onychophora 4M CO4, L4
5. a) Analyze the functional suitability of water vascular system in echinoderms 10M CO5, L4
b) Explain bipinnaria larva in relation to phylogeny 4M CO3, L2
OR
c). Examine the structural affinities of *Balanoglossus*. 10M CO4, L4
d). *Peripatus* is a connecting link. Analyze 4M CO4, L4

PRACTICAL- I (At the end of I Semester)

Title of the paper: Animal Diversity Biology of Non – Chordates

No of Hours: 30

Credits: 02

WEF: 2021-2022 Course Code: ZOO P11A

LEARNING OUTCOMES:

By the end of the course students will be able to

1. Understand the general characters and classification from Protozoa to Hemichordata
2. Understand the importance of preservation of museum specimens
3. Identify animals based on special identifying characters
4. Understand different organ systems through demo or virtual dissections
5. Maintain a neat, labeled record of identified museum specimens
6. Exhibit the hidden creative talent

COURSE OUTCOMES

CO1 To identify the characteristics and systematic position of protozoans and poriferans PO1, PO2, PO5, PO6, PO7, PSO1

CO2 To identify the characteristics and systematic position of Cnidarians and Helmenthes. PO1, PO2, PO5, PO6, PO7, PSO1

CO3 To identify the characteristics and systematic position of Annelids, Arthropodans and Molluscans. PO1, PO2, PO5, PO6, PO7, PSO1

CO4 To identify the characteristics and systematic position of Echinoderms and hemichordates. PO1, PO2, PO5, PO6, PO7, PSO1

CO5 To understand the various systems of Prawn by Dissecting and Mounting its appendages. PO1, PO2, PO5, PO6, PO7, PSO1

Syllabus
Course Details

Unit	Learning Units
Syllabus	General characters and classification of the following phyla and sub-phyla up to classes with suitable examples: Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata and Hemichordata.
I	<p>SPOTTERS</p> <p>Porifera: <i>Euspongia</i>, <i>Spongilla</i>, <i>Sycon</i>. Cnidaria: <i>Physalia</i>, <i>Velella</i>, <i>Aurelia</i>, <i>Gorgonia</i>, <i>Pennatula</i>. Annelida: <i>Nereis</i>, <i>Heteronereis</i>, <i>Aphrodite</i>, <i>Hirudineria</i>. Arthropoda: <i>Scylla</i>, <i>Macrobrachium</i>, <i>Scolopendra</i>, <i>Sacculina</i>, <i>Limulus</i>, <i>Scorpion</i>, <i>Peripatus</i>. Mollusca: <i>Chiton</i>, <i>Murex</i>, <i>Unio</i>, <i>Sepia</i>, <i>Loligo</i>, <i>Octopus</i>, <i>Nautilus</i>. Echinodermata: <i>Asterias</i>, <i>Ophiothrix</i>, <i>Echinus</i>, <i>Clypeaster</i>, <i>Cucumaria</i>, <i>Antedon</i>. Hemichordata: <i>Balanoglossus</i></p>
II	<p>SLIDES</p> <p>Protozoa: <i>Elphidium</i>, <i>Paramoecium</i>, <i>Paramoecium</i> - Binary fission and conjugation, <i>Vorticella</i>, <i>Entamoebahistolytica</i>, <i>Plasmodium vivax</i> Porifera: T.S and L.S. of <i>Sycon</i>, spicules, gemmule Cnidaria: <i>Obelia</i> colony and medusa, Platyhelminthes: <i>Planaria</i>, <i>Fasciola hepatica</i>, <i>Fasciolalarval</i> forms (Miracidium, Redia, Cercaria) <i>Echinococcus granulosus</i>, <i>Taeniasolium</i> Nematoda: <i>Ascaris lumbricoides</i> (male and female), <i>Ancylostomaduodenale</i> (male and female), <i>Dracunculus</i>, <i>Wuchereria</i> Annelida: Trochophore larva Arthropoda: Mouthparts of housefly, butter fly, male and female <i>Anopheles</i> and <i>Culex</i>, Crustacean larvae (nauplius, mysis, zoea) Mollusca: Glochidium larva Echinodermata: Bipinnarialarva Hemichordata: Tornaria larva</p>
III	<p><u>DEMONSTRATION OF DISSECTIONS</u></p> <p>1. Prawn: Nervous system Mounting of statocyst Mounting of appendages 2. Mounting of Insect mouth parts</p> <ul style="list-style-type: none"> • Animal Album to be submitted at the time of practical examination • Laboratory Record Book to be submitted at the time of practical examination

Suggested Manuals

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

I B.Sc. ZOOLOGY PRACTICAL EXAMINATION

Practical - I

Course Code: ZOO P11A

Title of the paper: Animal Diversity Biology of Non – Chordates

Time: 3hrs.

Max. Marks 40M

1. List out the general characters of Phylum ----- . CO1 L1 3 M
2. Identify and draw a neat labeled diagram of nervous system/appendages of prawn. 7M
CO 4 L3 Identification: 1 M
Diagram: 4 M
Labeling: 2 M
2. Prepare a neat mount of statocyst/ mouth parts of cockroach. 5 M
CO4 L3 Mounting: 2 M
Diagram: 1 M
Labeling: 2 M
3. Identify, draw a labeled diagram, classify and write notes on A, B, C, D and E
CO3 L2 5 X 3 = 15 M
A. Protozoa & Porifera
B. Cnidaria & Platyhelminthes
C. Nematoda & Annelida
D. Arthropoda
E. Mollusca, Echinodermata & Hemichordata

Identification: 1 M
Diagram: ½ M
Classification: ½ M
Comments: 1 M
4. Practical Record Book CO5 L3 5 M
5. VIVA CO6 L5 5M

Total Marks :- 40M

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).

NAAC recredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour**
Semester: - III

Course Code	ZOOT31A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 100%

COURSE OUTCOMES:

CO1	To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure. Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
CO2	To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
CO3	Acquiring in-depth knowledge on various aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders
CO4	Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
CO5	Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Cell Biology : Electron microscopic structure of animal cell. Structure and functions of Golgi complex, Endoplasmic Reticulum And Liposome's Structure and functions of Ribosome's and Mitochondria Structure and functions of Chromosomes (Polygene and Lamp brush chromosomes) Structure and functions of Nucleus and its components</p>	14
II	<p>CELLULAR METABOLISM Bio molecules Carbohydrates - Classification of carbohydrates; Structure of glucose Proteins - Classification of proteins; General properties of amino acids Lipids - Classification of lipids 1 Hour Carbohydrate metabolism – Glycogen metabolism, Gluconeogenesis Protein metabolism-Transamination, Deamination and Urea Cycle</p>	11
III	<p>GENETICS Gene interactions (lethal genes, Epistasis & Pleiotropy) DNA damage and repair Human karyotyping and amniocentesis Autosomal and allosomal disorders (Klinefelter syndrome, Turner Syndrome, Down syndrome, Phenylketonuria, Alkaptonuria & Sickle cell anaemia)</p>	11
IV	<p>ORGANIC EVOLUTION Modern synthetic theory of evolution Variations Isolating mechanisms Types of natural selection (directional, stabilizing & disruptive) Artificial selection Speciation – allopatry and sympatry. Microevolution vs. Macroevolution (Example: Darwin finches)</p>	10
V	<p>ANIMAL BEHAVIOUR Ethology and its branches. Concepts of Ethology (motivation, fixed action patterns, releasers, learning) Biological clocks Biological rhythms (Circadian, Circalunar and Circannual) Sexual behavior in animals (Intra sexual selection & Inter sexual selection) Coloration & Mimicry</p>	14

**A.G. &S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester III *w.e.f. 2022-2023*

(Model question paper)

Title of the paper: Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour

Code – ZOOT31A

Time: 3hrs.

max.marks: 75

Section – A

4 x 5= 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labeled diagrams wherever necessary.

Draw neat labeled diagrams wherever necessary.

SECTION –A

Answer and **FIVE** of the following

5x5=25 Marks

1. General properties of amino acids **CO2, L2**
2. Explain Urea Cycle **CO2, L2**
3. Klinefelter syndrome **CO3, L2**
4. Epistasis **CO3, L2**
5. Industrial melanism **CO4, L2**
6. Allopatry and sympatry **CO4, L1**
7. Classical conditioning **CO5, L2**
8. Circadian rhythms **CO5, L2**

SECTION – B

Answer any **FIVE** of the following

5X10=50 Marks

9. Write electron microscopic structure of animal cell **CO1, L6**
OR
Explain the structure and functions of polytene and lamp brush chromosomes. **CO1, L2**
 10. What are Carbohydrates? Write the classification of Carbohydrates. **CO2, L6**
OR
Write an essay on Protein Metabolism. **CO2, L6**
 11. Give an account on Gene Interactions. **CO3, L2**
OR
Narrate an essay on autosomal and allosomal disorders. **CO3, L2**
 12. Write an essay on Isolating mechanisms. **CO4, L6**
OR
Explain modern synthetic theory of evolution. **CO4, L2**
 13. Elucidate the biological rhythms in animals. **CO5, L1**
OR
Give an account of the types of mimicry in animals. **CO5, L6**
-

.Title:-Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour.

Code: ZOOP31A

Credits:- (02)

MAX.MARKS: 40 2hrs/week)

SYLLABUS

Learning Objectives:

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny and geological history of origin & evolution of animals.

I. CellBiology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis using permanent slides
3. Mounting of salivary gland chromosomes of *Chironomus*

II. Cellular Metabolism

1. Estimation of total proteins in given solutions by Biurette method.
2. Estimation of total carbohydrate by Trinder's method.

III. Genetics

A, B, O blood typing. Problems based on Blood grouping.

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]

Identification of genetic syndromes given on charts.

Pedigree Analysis

IV. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin finches (pictures)

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PAPER – III

Title: Cell Biology, Cellular Metabolism, Genetics, Organic Evolution and Animal Behaviour

w.e.f.2022-23.

Time:3hrs Model Question paper (External)Max.Marks: 40 M.
Paper Code: ZOOP31A

1. Describe ABO blood typing. Identify the given sample. **CO3,L27M**

Procedure 04

Slide Preparation 02

Result 01

2. In Holstein cattle the spotting of the coat is due to a recessive gene while a solid–coloured coat is dominant. What types of offspring might be produced by a cross between two spotted animals? Show how you reach your conclusion. The gene P is responsible for coat pattern. **CO3,L45M**

3. Identify, draw a labelled diagram and write a comment upon A, B, C, D and E. **5 X 3=15M**

CO1, CO2, CO3, CO4, CO5, L1

A. Down syndrome

B. Parental care in *Hippocampus*

C. Protective colouration in *Octopus*

D. Bee hive

E. *Cedaroid*

Identification 1

Diagram 1

Characters 1

4. Field Note book **03M**

5. Viva **05M**

6. RECORD **05M**

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**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC reaccredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **SUSTAINABLE AQUACULTURE MANAGEMENT**

Semester: - V

Course Code	ZOO-501	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction: 2022-23	Year of Offering 2022-2023	Year of Revision	Percentage of Revision: 100%

Learning Outcomes: -Students at the successful completion of this course will be able to

CO1: Evaluate the present status of aquaculture at the Global level and National level

CO2: Classify different types of ponds used in aquaculture

CO3: Demonstrate induced breeding of carps

CO4: Acquire critical knowledge on commercial importance of shrimps

CO5: Identify fin and shell fish diseases

||

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Present status of Aquaculture – Global and National scenario, Major cultivable species for aquaculture: freshwater, brackish water and marine.</p> <p>Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.</p> <p>Design and construction of fish and shrimp farms.</p>	15
II	<p>Functional classification of ponds – head pond, hatchery, nursery ponds.</p> <p>Functional classification of ponds -rearing, production, stocking and quarantine ponds.</p> <p>Need of fertilizer and manure application in culture ponds.</p> <p>Physio-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO₂ and nutrients)</p>	15
III	<p>Induced breeding in fishes</p> <p>Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization)</p> <p>Culture of Indian major carps - Stocking management</p> <p>Culture of Indian major carps - post-stocking management</p>	10
IV	<p>Commercial importance of shrimp & prawn</p> <p><i>Macrobrachium rosenbergii</i>- biology, seed production.</p> <p>Culture of <i>L. vannamei</i> – hatchery technology and culture practices</p> <p>Mixed culture of fish and prawns.</p>	10
V	<p>Viral diseases of Fin Fish & shellfish</p> <p>Fungal diseases of Fin & Shellfish</p> <p>Bacterial diseases of Finfish & Shellfish</p> <p>Prophylaxis in aquaculture</p>	10

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KRISHNA Dt.,A.P. (AUTONOMOUS)
SEMESTER-V (Model Question paper)**

Paper Title: SUSTAINABLE AQUACULTURE MANAGEMENT

w.e.f.- 2022-2023

Paper Code: ZOO 501C

Time: 3 hrs.Max.Marks:70

Part – A

Answer **any FOUR** questions out of eight in Part - A. Each question carries five marks.
4X5=20

Part – A

- 1 .Traditional culture
- 2Semi-intensive
- 3.Head pond
- 4.stockingponds.
- 5.Predators
- 6.Liming
- 7.*Macrobrachiumrosenbergii*
8. Bacterial diseases of Finfish

Part – B

Answer **any FIVE** questions out of eight in Part - B .Each question carries Ten marks.
5X10=50

9. Write an essay on Cultivable species for aquaculture from fresh water brackish water Marinewater.?
10. Write an essay on Design and construction of fish form?
11. Explain about Rearing pond?.
12. Write about water quality and soil characteristics suitable for fish culture?.
13. Give an account of Induced breeding infishes?
14. Write in detail about the post-stockingmanagement.
15. Write an essay on.Seedproduction?
16. Discuss about the Bacterial diseases of Finfish and shell fish?

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(AUTONOMOUS)

SEMESTER-V

Time: 3 hrs

Guide lines to the paper setter

Paper Title:SUSTAINABLE AQUACULTURE MANAGEMENT

Paper Code: ZOO -501C

Max.Marks:70m.

Note:1. Answer any FOUR questions out of eight in Part-A . Each question carries five marks.4X 5 = 20M.

2. Answer any FIVE questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	30	15	15

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

I. References:

1. Pillay TVR &M.A.Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd.,London
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & SonsInc.1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsvier Scientific PublishingCompany.
4. Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford &IBH Publishing Company Pvt.Ltd.

Web Links:

1. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm
2. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
3. <https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

PRACTICAL - V

w.e.f. 2022-2023.Code: ZOO- 501PMAX.MARKS: 50M

(2hrs/week)Credits: 02

(30 hrs) Sustainable Aquaculture Management
PRACTICAL SYLLABUS

Learning Outcomes: On successful completion of this practical course, student shall be able to:

- ❖ · Identify the characters of Fresh water cultivable species
- ❖ · Estimate physico chemical characteristics of water used for aquaculture
- ❖ · Examine the diseases of fin and shell fish
- ❖ · Suggest measures to prevent diseases in aquaculture

Practical (Laboratory) Syllabus:

1. Fresh water Cultivable species any (Fin & Shell Fish Specimens – Observation of morphological characters by observation and drawings)-5
2. Brackish water cultivable species (Fin & Shell fish- Specimens- Observation of Morphological Character by observing drawing) -5
3. Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/ Standard procedure can be demonstrated for the same)
4. Demonstration of Hypophysation (Procedure of hypophysation to be demonstrated in the Practicallab with any edible fish as model)
5. Viral diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of viral pathogens in fin/ shell fish – one edible specimen can be used for observation of same in the laboratory)
6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)
7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)

VI. Lab References

1. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company
2. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm
3. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
4. <https://www.notesonzooology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

Web resources suggested by the teacher concerned and the college librarian including reading material

VII. Co-Curricular Activities

a) **Mandatory:** *(Student training by teacher in field skills: Total 15 hrs., Lab:10 + field 05)*

1. For Teacher: Training of students by the teacher in laboratory/field for not less than 15 hours on Breeding- Induced breeding in carps -hatchery technology of *L. Vennami*- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory .
2. For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center and make careful observations of the process method and implements- protocols and report on the same in 10 pages hand written Fieldwork/Project work Report.
3. Max marks for Fieldwork/Project work Report: 05
4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements
5. (IE). Unit tests.

b) Suggested Co-Curricular Activities

1. Preparation of Model/Charts of Cultivable species of fin fish shell fish
2. Preparation of Model/Chart of Ideal fish Pond- with the standards prescribed.
3. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village)
4. Preparation of Model – charts of Fin /Shell fish Diseases with eco-friendly material.
5. Assignments, Group discussion, Seminar, Quiz, Collection of Material, Video preparation etc., Invited lecture

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A.P. (AUTONOMOUS)
PAPER – III**

Guide lines for the practical Examiner

W.e.f.2022-2023

Class: III B.Z.C

Paper Title: Paper: Sustainable Aquaculture Management Code: ZOO-501P

Credits:(02)Max.Marks: 25 M.

-
1. Spotters: Identify, draw neat labeled diagram and comment on A, B, C,D & E 5X2=10 m
 2. Estimation of Dissolved Oxygen in given water sample 5m
 - 3.. Procedure of hypophysation 4 m
 4. Commenton identification and study of Bacterial, viral and fungal diseases in edible fishes 3X2=6m
A,B & C

Total -- 25M

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ZOOLOGY PRACTICAL -V**

**(INTERNAL)
w.e.f. 2022-2023.**

(2hrs/week).

Sustainable Aquaculture Management

Code: ZOO-501P.

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 5M.
2. Record ----- 10M.
3. Assignments -----10M.

Total ----- 25M.

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COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level
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Title of the Paper: **POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES**

Semester: - V

Course Code	ZOO-502	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2022-23	Year of Offering 2022-2023	Year of Revision	Percentage of Revision: 100%

Objective of the course To prepare students to become future aqua culturists.

CO 1	Identify the types of preservation methods employed in aquaculture
CO 2	Choose the suitable processing methods in aquaculture
CO 3	They can earn while they learn
CO 4	Maintain the standard quality control protocols laid down in aqua industry
CO 5	Identify the best Seafood quality assurance system

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Handling and Principles of fish Preservation Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish. Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.</p>	15
II	<p>Methods of fish Preservation Traditional methods - sun drying, salt curing, pickling and smoking. .Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).</p>	08
III	<p>Processing and preservation of fish and fish by-products Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure. Fish by-products – fish glue, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.</p>	17
IV	<p>Sanitation and Quality control Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants. Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.</p>	08
V	<p>Quality Assurance, Management and Certification Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety. National and International standards – ISO 9000: 2000 Series of Quality Assurance System, <i>Codex Alimentarius</i>.</p>	12

**A.G& S.G.S.DEGREECOLLEGE OF ARTS & SCIENCE, VUYURU – 521165,
KRISHNA Dt.,A.P. (AUTONOMOUS)
SEMESTER-V (Model Question paper)**

Paper Title: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES w.e.f.- 2022-2023

Paper Code: ZOO 502

Time: 3 hrs.Max.Marks:70 m.

Part – A

Answer **any FOUR** questions out of eight in Part - A. Each question carries five marks.
4X5=20

Part – A

- 1.Post mortem changes
- 2 Cleaning,
- 3.Sun drying,
- 4.Canning,
- 5.Chitosan
- 6.Pre-processing control,
- 7.Good Manufacturing Practices
8. *Codex Alimentarius*.

Part – B

Answer **any FIVE** questions out of eight in Part - B .Each question carries Ten marks.
5X10=50

09. Give a detailed account on handling of fresh fish and storage fish
10. Describe the processes principles of preservation
11. Explain Traditional methods of fish drying
12. Explain any four fish products?
13. Describe any four fish by products?
14. Give a detailed note on sanitation in processing plant.
15. Describe the process of quality control in processing plants
16. Write about National and International standards for quality control. ?

**A.G& S.G.S.DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU 521165, KRISHNA Dt., A.P.
(AUTONOMOUS)**

SEMESTER-V

Time: 3 hrs

Guide lines to the paper setter

Paper Title:POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

Paper Code: ZOO -502

Max.Marks:70m

Note: 1. Answer **any FOUR** questions out of eight in Part-A . Each question carries five marks. 4X 5 = 20M.

2. Answer any **FIVE** questions out of eight in Part-B . Each question carries 10 marks. 5 X 10 = 50M.

	PART	Unit – I	Unit – II	Unit – III	Unit – IV	Unit – V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	1	2	2	1
Weightage		30	20	25	25	20

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be both in English and Telugu media.

III. References:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, NewDelhi
2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun Publishing House
3. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications
4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science, Technology and Nutrition)by H A Bremner
5. K.A Mahanthy, Innovations in Fishing and Fish Processing Technologies, January 2021

Web Resources:

1. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>
2. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation.
- Analyze the protocols of aqua processing methods.

Practical Syllabus:

1. Evaluation of fish/fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish
3. Examination of salt, protein, moisture in dried/cured products
4. Examination of spoilage of dried/cured fish products marinades, pickles, sauce.
5. Preparation of fish gelatin, collagen and chitosan from shrimp and crab shell.
6. Developing flowcharts and exercises in identification of hazards – preparation of Hazard analysis worksheet
7. Corrective action procedures in processing of fish – flowchart – worksheet preparation.

References:

- Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.
2. Bond, et al. 1971. *Fish Inspection and Quality Control*. Fishing News Books, England.

Websites of Interest:

- https://www.youtube.com/watch?v=xyf_g7fku-4
https://www.youtube.com/watch?v=bvtqb_cmy4

Co-Curricular Activities

- a) Mandatory:** (*Lab/field training of students by teacher (lab 10 + field 05)*): 1. For Teacher: Training of students by the teacher in laboratory/field for not less than 15 hours on various steps of post-harvest techniques of fishes, on the advanced techniques in post-harvest technology – Training of students on other employability skills in the Post-harvest sector of Aquaculture Industry- like Processing, Packing, marketing of processed aqua products. 2. For Student: Students shall (individually) visit - Any fish/shrimp Processing Plant/Packing industry and make observations on post harvesting techniques and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements*
5. (IE): Unit tests,

b) Suggested Co-Curricular Activities

1. Observation of fish/shrimp processing plants – visit web sites of processing companies and record the details of that Unit
2. Interaction with local fishermen to know the method of preservation and details with the available traditional technology
3. Collection of web resources on the Quality assurance, quality control measures in Aqua Industries- cross checking the standards during the visit to any processing units. 4. Assignments, Seminar, Group discussion. Quiz, Collection of Material, Invited lecture, Video preparation etc.,

**A. G & S. G. S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU 521165, KRISHNA Dt.,
A.P. (AUTONOMOUS)
PAPER – III**

Guide lines for the practical Examiner

W.e.f.2022-2023

Class: III B.Z.C

Paper Title: Paper: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES Code: ZOO-502P

Credits:(02)Max.Marks: 25 M.

-
- | | |
|--|----|
| 1. Evaluation of fish/fishery products for organoleptic and microbial quality. | 6m |
| 2. Preparation of dried and fermented fish | 4m |
| 3 Examination of salt in dried fish products | 5m |
| 4 Examination of spoilage of cured fish pickles . | 5m |
| 5 Preparation of isinglass shrimp and crab shell. | 5m |

Total -- 25M

**A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165
ZOOLOGY PRACTICAL -V**

**(INTERNAL)
w.e.f. 2022-2023.**

(2hrs/week).

Title:-**POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES**

Code: ZOO-502P.

Max.marks:25M.

Time: 3hrs.

- | | |
|----------------|------------|
| 1. Attendance | ----- 5M. |
| 2. Record | ----- 10M. |
| 3. Assignments | -----10M. |

Total ----- 25M.

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level
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Title of the Paper: **Health and Hygiene**

Semester: - III

Course Code	LSCZOOT01	Course Delivery Method	Class Room/Blended Mode - Both
Credits	2	CIA Marks	00
No. of Lecture Hours/ Week	10	Semester End Exam Marks	50
Total Number of Lecture Hours		Total Marks	50
Year of Introduction :	Year of Offering 2022-2023	Year of Revision – 2021-23	Percentage of Revision: 0%

LIFE SKILL COURSE	Course code: LSCZOOT01	2022-2023	BA, B. Com (G), B.Com e-commerce, B.Com-Computers, A.B.C., & B.Z.C
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Learning Outcomes:

- To provide knowledge on different health indicators and types of hygiene methods
- To impart knowledge on different health care programmes taken up by India
- To make student understand the latest concepts of health such as HIA, EIA, SIA and SEA
- To enable student with disaster mitigation strategies
- To create awareness on community health and hygiene
- To enrich knowledge on communicable and non-communicable diseases and their control
- To aware the student on the importance of food, social strategies, mental status and physical activities on health
- To introduce different community-based mobile apps on health to student and thereby to the community

Course Outcomes: On completion of this course, the students will be able to understand -

- What is a healthy diet
- How can we use available information to optimize our diet?
- Can nutrition be used for a healthy life?
- Is there a one-size-fits-all “good” diet or should we individualize our dietary goals?
- Disaster management and responsiveness of public in pandemic and epidemic diseases
- Assess the impact of policies on health and hygiene Health measures to consider
- While travelling
- Awareness in public through digital media viz., mobile apps

Syllabus

Course Details

Unit	Learning Units	Lecture Hour
I	<p><u>Basics of Nutrition</u> Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning Carbohydrates – functions, dietary sources, effects of deficiency. Lipids – functions, dietary sources, effects of deficiency. Proteins – functions, dietary sources, effects of deficiency. Brief account of Vitamins- functions, food sources, effects of deficiency, Macro and micro minerals – functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc Importance of water– functions, sources, requirement and effects of deficiency.</p>	10
II	<p><u>Health</u> Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association), WHO-India, UNICEF-India National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram (RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK) Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public.</p>	10
III	<p><u>Hygiene</u> Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Meraaspaal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid19AP</p>	10

A.G. &S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165, Krishna Dt. A.P.
(Autonomous)

Semester –III

w.e.f. 2022-2023Time: 90 mins

(Model question paper)

Title of the paper:Health and HygieneCode – LSCZOOT01

max.marks: 40

Section – A

Answer any **four** questions. Each question carries **five** marks. $2 \times 5 = 10$.

1. Balanced Diet
2. Vitamins
3. ICMR
4. Village Health Nutrition Day

Section – B

Answer any **three** questions. Each question carries **Ten** marks. $3 \times 10 = 30$

5. Define Nutrition and write it's importance?
6. What are Carbohydrates, write itsfunctions, dietary sources, effects ofdeficiency.
7. Define Health Explainthe Determinants of health. ?
8. Write an essay on National Institution of Nutrition (NIN)?
9. Write an essay onCommunity & Personal Hygiene?
10. Give an accountPradhanMantri SurakshitMantritva Abhiyan (PM Suman Yojana)?

SEMESTER-III
SKILL DEVELOPMENT COURSE

Guide lines to the paper setter
Max.Marks:40

Time: 1¹/₂ hrs

Paper Title: Health and Hygiene Code – LSCZOOT01-.

*Note:*1. Answer **any four** questions out of eight in Part-A. Each question carries five marks.2X 5 = 10M.

2. Answer any**three** questions out of five in Part-B. Each question carries 10 marks.3 X 10 = 30M.

	PART	Unit –I	Unit – II	Unit-III
5 Marks Questions	A	2	1	1
10 Marks Questions	B	2	2	2
Weightage		30	35	25

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU**

An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam

**NAAC reaccredited at 'A' level
ISO 9001-2015**



**BOARD OF STUDIES MEETING
FOR B.SC. BZC2022-2023
II & IV & VI SEMESTERS**

25th March 2023

DEPARTMENT OF ZOOLOGY

**AG & SG Siddhartha Degree College of Arts & Science
Vuyyuru**

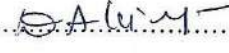
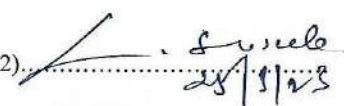
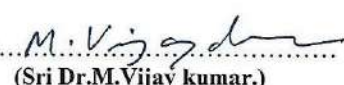

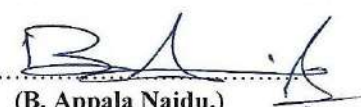
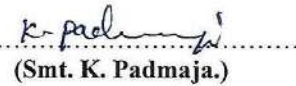
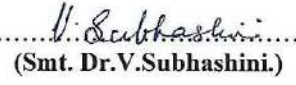

2022-2023

Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10:00 am on 25-03-2023 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

Presiding

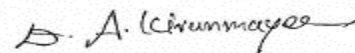
Members Present:

- 1)  Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee.) A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2)  University Nominee Bio Sciences & Bio technology
(Smt. Dr.L.Suseela.) Krishna University
Machilipatnam.
- 3)  Academic Council Head, Department of Zoology,
(Sri Dr.M.Vijay kumar.) Nominee SRR & CVR Govt. Degree College,
Vijayawada.
- 4)  Academic Council Head, Department of Zoology,
(Sri Ch. Venkateswaralu.) Nomine P.B. Siddhartha College,
Vijayawada.
- 5)  Industrialist Principle Scientific Officer,
(B. Appala Naidu.) RGCA
Manikonda.
- 6)  Member Lecturer in Zoology,
(Smt. K. Padmaja.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 7)  Member Lecturer in Zoology,
(Smt. Dr.V.Subhashini.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 8)  Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi.) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

ZOOLOGY

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of IB.Sc (B.Z.C) for the academic year 2022 - 2023.
2. To recommend the syllabi (Theory & Practical), Model question paper for IV Semester of II B.Sc (B.Z.C) for the academic year 2022 - 2023.
3. To recommend the Blue print for the semester end exam for II&IV semester of I & IIB.Sc (B.Z.C) for the academic year 2022 - 2023.
4. To introduce Skill Development Course –Poultry Farming for I year students in this academic year 2022-23.
5. To recommend the teaching and evolution methods to be followed under Autonomus status.
6. Any other matter.



Chairman.

ZOOLOGY- RESOLUTIONS

1. It is resolved to continue the same syllabi (Theory & Practical), model question paper & guide lines to be followed by the question paper setters of Zoology of II semester of I B.Sc. (B.Z.C) under Choice Based Credit System (CBCS) to be approved by the Academic Council of 2022 – 2023.
2. It is resolved to implement new paper for IV SEM of II B.Sc. BZC as approved by BOS members. The paper title is Embryology, Animal Physiology and Animal Ecology. It is resolved to continue the same syllabus for the IV SEM of II B.Sc. BZC in 402 paper.
3. It is resolved to Continue the same Blue prints of II&IV Semesters of B.Sc Zoology for the Academic year 2022-2023.
4. It is resolved to implement Skill Development Course for I year students in Poultry farming.
5. It is resolved to continue the following teaching & evaluation methods for the Academic year 2022-23.
6. In VI Sem there is 3 months Internship for III BZC students

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

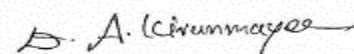
Evaluation of a student is done by the following procedure:

❖ Internal Assessment Examination:

- ❖ Out of maximum 100 marks in each paper for I B.Sc, 30 marks shall be allocated for internal assessment.
- ❖ Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for I B.SC.
- ❖ Out of maximum 100 marks in each paper for II B.Sc, 25 marks shall be allocated for internal assessment.
- ❖ Out of these 25 marks, 15 marks are allocated for announced tests (i.e .IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated on assignment and remaining 5 marks seminar for IV semester.

❖ Semester – End Examination:

- ❖ The maximum mark for I (BZC) semester – End examination shall be 70 marks and duration of the examination shall be 3 hours.
- ❖ The maximum mark for II B.Sc semester- End examination shall be 75 marks and duration of the examination shall be 3 hours. Even though the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”
- ❖ Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I & IV semester for I & II B.Sc.
- ❖ Discussed and recommended for organizing Seminars, Guest lectures, Work – Shops to upgrade the Knowledge of students, for the approval of the Academic Council.



Chairman

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE
OF ARTS & SCIENCE, VUYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

❖ **ALLOCATION OF CREDITS**

❖ **For the Papers offered during II&IV Semesters**

Year	Semester	Title	Teaching hours	Internal marks	External marks	Credits
I	II	Animal Diversity Biology of Chordates	4	30	70	03
		Practical – II	2	10	40	02
	II	Poultry farming	2	15	35	02
II	IV	Embryology, Physiology, & Ecology	4	25	75	03
		Practical – IV	2	10	40	02
		Immunology & Animal Biotechnology	4	25	75	03
		Practical – V	2	10	40	02
III	VI	VIII	SEMESTER INTERNSHIP			

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).

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Title of the Paper: **Animal Diversity Biology of Chordates**

Semester: - II

Course Code	ZOOT21A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

Course Objectives:

- To understand the structural organization of animals of prochordates and cyclostomes.
- To understand the type study belonging to Pisces.
- To understand type study belonging to amphibian.
- To understand the type study belonging to reptilia and identification of poisonous snakes.
- To understand the type study belonging to Aves and Aquatic mammals.

Course Outcomes:

CO1	Gain knowledge in the major Chordate groups, describe their salient features, appreciate the diversity and analyze the uniqueness of different groups.
CO 2	Understand the fundamental organization of chordates and evaluate the similarities and differences among the different groups of chordates in the light of evolutionary significance.
CO 3	Comprehend and compare the morphology and anatomy of different classes of chordates and apply the same to their fitness in the ecological habitats
CO 4	Develop the skill of identifying the vertebrate fauna in general and South Indian fauna in specific.
CO 5	Acquaint with the significance of unique mechanisms and behavioral patterns exhibited by different groups of chordates.

Syllabus

Unit	Learning Units	Lecture Hours
I	UNIT I 1.0. Protochordates to cyclostomes 1.1. Protochordates 1.1.1 Salient features of Urochordata and Cephalochordata 1.1.2. Structure and life-history of <i>Herdmania</i> , 1.1.3. Significance of retrogressive metamorphosis. 1.2. General organization of vertebrates 1.3. General characters of cyclostomes 1.4. Comparison of <i>Petromyzon</i> and <i>Myxine</i> 1 hour	8 hrs
II	UNIT II 2.0 Fishes 2.1. Type study – <i>Scoliodon</i> - Morphology, respiratory, circulatory, excretory and nervous systems and sense organs. 2.2. Migration in fishes. 2.3. Viviparity in fishes 2.4. Types of scales 2.5. Accessory respiratory organs in fishes	13 HOURS
III	UNIT III 3.0. Amphibia 3.1. South Indian Amphibians. 3.2. Type study - <i>Rana</i> : Morphology, digestive system, respiratory system, circulatory system, excretory system, nervous system and reproductive system 3.3. Parental care in amphibians	11 HOURS
IV	UNIT IV 4.0. Reptilia 4.1. South Indian Chelonians. 4.2. Type study – <i>Calotes</i> : Morphology, digestive, respiratory, circulatory, urinogenital and nervous systems. 4.3. Identification of poisonous snakes	11 HOURS
V	UNIT V 5.0. Aves and Mammalia 5.1. Aves 5.1.1 Birds as Glorified Reptiles. 5.1.2. Type study-Pigeon (<i>Columbialivia</i>): Exoskeleton, respiratory, circulatory and excretory systems 5.1.3. Significance of migration in birds 5.1.4. Flight adaptations in birds 5.2. Mammalia 5.2.1. Aquatic Mammals 5.2.2. Dentition in Mammals.	17 HOURS

Textbooks

1. R.L. Kotpal, *Modern Text Book of Zoology - Invertebrates*.
2. P.S. Dhami and J.K. Dhami *Invertebrate Zoology*.

Recommended Reference book:

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. Marshall, 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.

Course Delivery method: Face-to-face / Blended.

Course has focused on: Foundation

Websites of Interest:

https://www.youtube.com/watch?v=-mcfPHd_sH8
<https://www.youtube.com/watch?v=U8F9IzuwdzQ>
<https://www.youtube.com/watch?v=jhXqly49YEw>
<https://www.youtube.com/watch?v=ywD50XyayFk>

Co-curricular Activities:

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons
- Additional input on types of snake poisons and their antidotes (student activity).
- Collection of bird feathers and submission of report on Plumology
- Taxidermic preparation of dead birds for Zoology Museum
- Map pointing of prototherian and metatherian mammals
- Chart preparation for dentition in mammals

D.A. Kiranmayee

Signature of the Course In-charge

D.A. Kiranmayee

Signature of the Program In-charge

Signature of the HOD

II SEMESTER END EXAMINATIONS

PAPER – IIMODEL PAPER Cours Code: ZOOT21A

Title of the paper: Animal Diversity Biology of Chordates
(W.E.F 2022-2023)

Time: 3 Hours

Max. Marks: 70

Draw neat labelled diagrams wherever necessary.

SECTION –A (20M)

Answer all Questions

(Restrict to maximum of 2 sub divisions)

1. i. Describe the structure of *Herdmania*– CO1 L2 4M
(Or)
ii. Enumerate the general characters of Cephalochordata – CO1 L1 4M
2. i. Explain the different types of Scales in fishes –CO2 L2 4M
(Or)
ii. Explain Viviparity in fishes – CO2, L2 4M
3. i. Describe the southindian amphibians– CO3, L2 4M
(Or)
ii. Describe the ventricles of brain of frog – CO3, L2 4M
4. i. Distinguish between poisonous and non-poisonous snakes – CO4, L2 4M
(Or)
ii. Describe the functions of brain of calotes- CO4, L2 4M
5. i. explains the structure of tooth. CO5, L2 4M
(Or)
ii. Describe the structure of quill feather. CO5, L2 4M

SECTION – B(50M)

Answer all Questions

(Restrict to maximum of 2 sub divisions)

- 6.i. What is meant by Retrogressive Metamorphosis? Apply the phenomenon with reference to the development of *Herdmania* – CO1, L3 10M
(Or)
ii. Enumerate the General characters of Cyclostomes – CO1 L3 10M
7. i. Describe the Respiratory system in *Scoliodon*– CO2, L2 10M
(Or)
ii. Explain the significance of Accessory respiratory organs –CO2, L2 10M
8. i. Describe Respiratory system in *Rana*– CO3, L2 10M
(Or)
ii. Discuss Parental Care in Amphibians – CO3 L2 10M
9. i. Explain about the South Indian Chelonians – CO4, L2 10M
(Or)
ii. Describe the structure and working of heart of *Calotes*- CO4, L2 10M
10. i. Describe the Respiratory system in Pegion – CO5, L2 10M
(Or)
ii. Explain about the Aquatic Mammals – CO5, L2 10M

PRACTICAL- II (At the end of II Semester)

Title of the paper: Animal Diversity -Biology of Chordates

No of Hours: 30

Credits: 02

WEF: 2022-2023 Course Code: ZOOP21A

LEARNING OUTCOMES:

By the end of the course students will be able to

1. to Understand the general characters and classification from Pisces to Mammalia
2. to Understand the importance of preservation of museum specimens
3. to Identify chordates based on special identifying characters
4. to Understand different organ systems through demo or virtual dissections
5. to Maintain a neat, labeled record of identified museum specimens
6. to Exhibit the hidden creative talent

COURSE OUTCOMES:

CO1	To identify the systematic position of Protochordata, Cyclostomata and Pisces. PO1, PO2, PO5, PO6, PO7, PSO1
CO2	To identify the systematic position of Amphibians and Reptiles. PO1, PO2, PO5, PO6, PO7, PSO1
CO3	To identify the systematic position of Aves and mammals. PO1, PO2, PO5, PO6, PO7. PO1, PO2, PO5, PO6, PO7, PSO1
CO4	To Study the Appendicular skeleton of Varanus, Gallus and Oryctolagus. PO1, PO2, PO5, PO6, PO7, PSO1
CO5	To understand the various systems of Fish by Dissecting and process of Mounting the scales of Fish. PO1, PO2, PO5, PO6, PO7, PSO1

SYLLABUS

General characters and classification of the following phyla and sub-phyla up to classes with suitable examples: Pisces (up to subclass only), Amphibia (up to orders), Reptilia (up to orders), Aves (up to subclass only) and Mammalia (up to infraclass only).

I. SPECIMENS.

1. Protochordata: Herdmania, Amphioxus.

Slides: Amphioxus T.S through pharynx.

2. Cyclostomata: Petromyzon, Myxine.

3. Pisces: Pristis, Torpedo, Channa, Pleuronectes, Labeo, Catla, Hippocampus, Exocoetus, Echeneis, Clarias, Anguilla.

Slides: Fish scales.

4. Amphibia: Ichthyophis, Amblystoma, Siren, Axolotl larva, Hyla, Rhacophorus.

5. Reptilia: Trionyx, Testudo, Draco, Chamaeleon, Uromastix, Daboia (=Vipera) russelli, Naja,

Enhydrina, Bungarus, Crocodilus.

6. Aves: Psittacula, Bubo, Alcedo, Passer, Eudynamis, Corvus

Different types of feathers- quill, contour, filoplume and down.

7. Mammalia: Ornithorhynchus, Didelphys, Pteropus, Funambulus, Manis, Erinaceus.

II. OSTEOLOGY.

Appendicular skeleton of Varanus, Gallus and Oryctolagus - limbs and girdles.

III. DEMONSTRATION OF DISSECTIONS

1. Mounting of fish scales.

2. Channa: Digestive system

3. Scoliodon: V, VII, IX and X cranial nerves.

Suggested Manuals:

Suggested manuals

1. Practical Zoology – Vertebrata - S.S.Lal
2. A manual of Practical Zoology – Chordata P.S.Verma

Course Delivery method: Face-to-face / Blended.

Course has focused on: Skill Development

Weblinks:

<https://www.youtube.com/watch?v=-2Q2rqEh0Bk>

<https://www.youtube.com/watch?v=C35LwntxUKE>

<https://www.youtube.com/watch?v=OuEUQRQ3iQo>

Co-curricular Activities:

Preparation of slides of scales of fishes

- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons
- Additional input on types of snake poisons and their antidotes (student activity).
- Collection of bird feathers and submission of report on Plumology
- Taxidermic preparation of dead birds for Zoology Museum
- Map pointing of prototherian and metatherian mammals
- Chart preparation for dentition in mammals

D.A Kiranmayee

Signature of the Course In-charge

D.A Kiranmayee

Signature of the Program In-charge

Signature of the HOD

I B.Sc. ZOOLOGY PRACTICAL EXAMINATION

Practical - IICourse Code: ZOOP21A

Title of the paper: Animal Diversity Biology of Chordates

Time: 3hrs.

Max. Marks 40M

1. List out the general characters of Class Mammalia. CO5, L 5 M

2. Identify and draw a neat labelled diagram of digestive system of *Channa*. CO2, L3 10 M
Identification: 2M
Diagram: 4 M
Labelling: 4 M

3. Identify, draw a labelled diagram, classify and write notes on A, B, C, D and E CO1,2,3,4,5 L2
5 X 3 = 15 M
A. Protochordata and Cyclostomata
B. Pisces
C. Amphibia and Reptilia
D. Aves and Mammalia
E. Osteology
Identification: 1 M
Diagram :¹/₂
Classification: ¹/₂
Comment 1 M

4. Practical Record Book CO1, 2,3,4,5 L3 5 M

5. VIVA CO1, 2,3,4,5 L5 5 M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC reaccredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Embryology, Animal Physiology and Animal Ecology.**

Semester: - IV

Course Code	ZOOT41A	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2017-18	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

OBJECTIVES

- The study of fundamentals of embryology
- The study of functional aspects of the body.
- Understanding the mechanism of homeostasis
- Understanding the mechanism of coordination in the body.
- Understanding the structural and functional aspects of an ecosystem.
- Understanding the dynamics of populations

COURSE OUTCOMES

CO 1	Comprehend and describe the process of formation and fusion of gametes and appraise the significance of foetal membranes and placenta in the formation of an embryo.
CO 2	Understand the mechanism of functioning of the different organ systems of a vertebrate and analyse their coordination in adapting the animal to the changing environment.
CO 3	Identify and describe the histology of various organs of a mammal and developmental stages of chick embryo at different hours of incubation.
CO 4	Develop skill in conducting tests for identification of the presence of biomolecules and excretory products and estimating various water parameters.
CO 5	Acquaint with the structural and functional aspects of an ecosystem, concept of community and population - their characteristics and interactions and analyse the adaptations of animals to specific habitat and explain peculiarities in their distribution in different zoogeographical realms.

SYLLABUS

I	UNIT- I	14hrs
	<p>Embryology Spermatogenesis, oogenesis and Fertilization. Types of eggs Types of cleavages Development of frog up to gastrulation and formation of primary germ layers Foetal membranes and their significance in chick embryo Placenta in mammals: types and functions</p>	
II	UNIT- II	14hrs
	<p>Physiology – I Digestive system: process of digestion Absorption of digested food Respiratory system - Pulmonary ventilation, transport of oxygen and Carbon dioxide Circulatory system - Structure and functioning of heart, Cardiac cycle. Excretory system - Structure of nephron, urine formation, and counter current Mechanism</p>	
III	UNIT - III	12hrs
	<p>Physiology - II Nerve impulse -Resting membrane potential, origin and propagation of action potentials along myelinated and non- myelinated nerve fibres Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle contraction Endocrine glands - Structure, secretions and the functions (of hormones) of pituitary, thyroid, parathyroid, adrenal glands and pancreas Hormonal control of reproduction in human being 1 Hour</p>	
IV	UNIT - IV	11hrs
	<p>Ecology I Physical and chemical factors of an ecosystem Pressure Atmospheric gases: oxygen and carbon dioxide. Functional aspects of an ecosystem Biogeochemical cycles: nitrogen cycle, phosphorus cycle and carbon cycle Animal communities Types of communities Community structure Ecotone and edge effect, Community interactions Prey-predator relationships Competition</p>	
V	UNIT - V	9hrs
	<p>Ecology - II Habitat Ecology and adaptations Ecological habitat and niche Desert adaptations, Pelagic adaptations Population Ecology Characteristics of animal populations <u>Zoogeography</u> Zoogeographical regions: Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions.</p>	

Textbooks

1. A.K. Berry, *A Text Book of Animal Physiology*, Delhi
2. Subrahmanyam N.S. & Sambamurthy A.V.S.S, *Ecology*, Narosa Publishing House, New Delhi

Suggested Readings

1. Gerard J. Tortora and Sandra Reynolds Garbowski *Principles of Anatomy and Physiology*, Tenth Ed., John Wiley & Sons
2. Arthur C. Guyton MD, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
3. William F. Ganong, *A Review of Medical Physiology*, 22 ed, McGraw Hill, 2005
4. Sherwood, Klandrof, Yanc, *Animal Physiology*, Thompson Brooks/Coole, 2005.
5. Sherwood, Klandrof, Yanc, *Human Physiology*, Thompson Brooks/Coole, 2005.
6. Knut Schmidt-Nielson, *Animal Physiology*, 5thed, Cambridge Low Price Edition.
7. Roger Eckert and Randal, *Animal Physiology*, 4thed, Freeman Co, New York.
8. Balinisky B.I. *An introduction to Embryology*, 5thed, Thompson Brook, Coole.
9. McEwen, R.s. *Vertebrate Embryology*, Oxford and IBH Publishing Co. New Delhi.
10. M.P. Arora, '*Ecology*' Himalaya Publishing company.
11. P.D. Sharma, '*Environmental Biology*'.
12. P.R. Trivedi and Gurdeep Raj. '*Environmental Ecology*'
13. Buddhadev Sarma and Tej Kumar, *Indian Wildlife Threats and Preservation*
14. Chapman J.L. and Reiss M.J, *Ecology Principles and Applications*, Second Ed., Cambridge University Press, London.
15. Benny Joseph, *Environmental Studies*, TATA McGraw Hill Com., New Delhi.
16. Eugene P. Odum, *Fundamentals of Ecology* Third Ed., Nataraj Publishers, Dehradun.
17. Balinisky B.I. *An introduction to Embryology*, 5thed, Thompson Brook, Coole.
18. McEwen, R.s. *Vertebrate Embryology*, Oxford and IBH Publishing Co. New Delhi.

Course Delivery method: Face-to-face / Blended.

Course has focused on: Foundation

Weblinks

<https://www.youtube.com/watch?v=4Q43dqaIvnc>

<https://www.youtube.com/watch?v=7LqQYmgMqLk>

<https://www.youtube.com/watch?v=qtTLiQoYTyQ>

CO-CURRICULAR ACTIVITIES

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health center, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Preparation of models of different types of eggs in animals
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

D.A. Kiranmayee

Signature of the Course In-charge

D.A. Kiranmayee

Signature of the Program In-charge

Signature of the HOD

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165,
Krishna Dt. A.P. (Autonomous)**

Semester IV

w.e.f. 2022-2023

(Model question paper)

Title of the paper: Embryology, Animal Physiology and Animal Ecology.

Code – ZOOT41A

Time: 3hrs.

Max.Marks: 75

SECTION –A

Answer and FIVE of the following

5x5=25 Marks

Draw neat labelled diagrams wherever necessary.

1. Mention the different types of eggs CO1, L1
2. Explain fate maps of frog blastula CO2, L2
3. Illustrate the structure of nephron CO3, L3
4. Analyze the process of absorption of lipids CO3, L4
5. Explain the significance of adrenal hormones CO3, L5
6. Explain Phosphorous cycle CO4, L2
7. Write a comparative account on ecotone and edge effect. CO5, L4
8. List out the different pelagic adaptations. CO5, L1

SECTION – B

Answer any FIVE of the following

5X10=50 Marks

Draw neat labelled diagrams wherever necessary.

9. Write an essay on foetal membranes and their significance in chick embryo. CO2, L2
OR
Describe the process of gametogenesis CO2, L2
10. Explain the process of transportation of Oxygen through blood.CO3, L2
OR
Describe the structure and functioning of mammalian heart. CO3, L2
11. Write an essay on hormonal control of reproduction in human beings. CO3, L4
OR
Explain the propagation of action potential along myelinated and non-myelinated nervefibres. CO3, L4
12. Explain pressure as an ecological factor. CO4, L2
OR
Explain prey-predator relationships in animal communities.CO5, L2
13. Write an essay on the various adaptations of desert animals. CO5, L1
OR
Describe the physical features and fauna of Ethiopian region.CO5, L1

PRACTICAL - IV

.Title:- Embryology, Animal Physiology and Animal Ecology

Code: ZOOP41A

Credits:- (02)

MAX.MARKS: 40

(2hrs/week)

OBJECTIVES

- Identify the different stages of development of a vertebrate embryo
- Analyze the presence of various substances of metabolism
- Estimate the amount of chemical parameters of a water body
- Maintain a neat, labelled record of work done in the laboratory

Syllabus:

I. Embryology

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Construction of fate map of frog blastula
4. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Study of activity of salivary amylase under optimum conditions
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage of a mammal

III. Ecology

1. Determination of pH of given sample.
2. Estimation of dissolved oxygen of given sample.
3. Estimation of total alkalinity of given sample.
4. Estimation of salinity of given sample.

REFERENCE BOOKS:

1. Harper's Illustrated Biochemistry
2. Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley & sons. Inc.
3. Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
4. Laboratory techniques by Plummer

Course Delivery method: Face-to-face / Blended.

Course has focused on: Skill Development

Weblinks

<https://www.youtube.com/watch?v=4Q43dqaIvnc>

<https://www.youtube.com/watch?v=7LqQYmgMqLk>

<https://www.youtube.com/watch?v=qtTLiQoYTyQ>

CO-CURRICULAR ACTIVITIES

- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health center, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Preparation of models of different types of eggs in animals
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

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PAPER – IV

Title: Embryology, Animal Physiology and Animal Ecology

w.e.f.2022-23.

Time:3hrs Model Question paper (External)Max.Marks: 40 M.

Paper Code: ZOOP41A

1. Identify any two organic substances (Proteins and Carbohydrates) present in the given tissue sample. Write the procedure and tabulate the results. 10 M

2. Estimate the total Alkalinity of the water sample. Write the procedure and tabulate the results. 10 M

i. Procedure 03

ii. Experiment 05

iii. Table 02

3. Identify, Classify, Draw diagrams and write notes on. 4 X 2 ½ = 10M

A. Histology slide

B. Histology slide

C. Embryology slide

D. Embryology slide

Identification: 1 M

Diagram: ½ M

Comments: 1 M

4. PRACTICAL RECORD BOOK

10M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

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Title of the Paper: Immunology and Animal Biotechnology

Semester: - IV

Course Code	ZOOT01	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021-22	Year of Offering 2021-2022	Year of Revision – 2021-22	Percentage of Revision: 0%

OBJECTIVES

- To understand the different types of immunity in man and different cells and organs of immune system
- To understand the different types of antigens and antibodies
- To analyze the role of immunity in health and disease management and get acquainted with the concept of vaccination
- To understand the mechanism of techniques in r DNA technology and the concept of animal cell technology.
- To study the reproductive technologies and different aspects of industrial biotechnology.
- To be aware of the ethical, legal, and social issues related to genetically modified organisms.

COURSE OUTCOMES

CO 1	Understand the basic concepts of immune system and hypersensitivity reactions and apply the same in identification of diseases and describe the triggering and regulation of immunological response.
CO 2	Acquire basic knowledge in r DNA technology and acquaint with the techniques of PCR, hybridization and DNA sequencing.
CO 3	Comprehend Animal Cell Culture technology, Reproductive technologies and techniques.
CO 4	Apply the techniques of animal biotechnology in various fields like industry, medicine, animal husbandry etc., for improving the quality of life.
CO 5	Acquaint with safety measures in using the techniques and develop skills in handling and maintaining laboratory equipment.

Syllabus

I	UNIT – I Immunology – I (Overview of Immune system) Introduction to basic concepts in Immunology Innate and adaptive immunity Cells of immune system Organs of immune system Antigens: Basic properties of antigens B and T cell epitopes, haptens and adjuvant Factors influencing immunogenicity	13hrs
II	UNIT – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity) Antibodies Antigen – antibody reactions Structure of antibody Classes and functions of antibodies Structure and functions of major histocompatibility complexes Exogenous and Endogenous pathways of antigen presentation and processing Hypersensitivity – Classification and Types Basic properties and functions of cytokines Vaccines and Immunization programme	17hrs
III	UNIT – III Biotechnology – I (Techniques of Recombinant DNA technology) Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery PCR: Principle, procedure and advantages of PCR DNA Sequencing: Maxam Gilbert and Sanger’s methods of DNA sequencing- traditional and automated sequencing Hybridization techniques: Southern, Northern and Western blotting	11hrs
IV	UNIT – IV Biotechnology – II (Cell culture techniques) Animal Cell, Tissue and Organ culture media: Natural and Synthetic media Cell cultures Establishment of cell culture: Primary culture, Protocols for Primary Cell Culture and Secondary culture Types of cell lines: Continuous and Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero) Organ culture; Cryopreservation of cultures Stem cells: Types of stem cells and applications Hybridoma Technology: Production & applications of Monoclonal antibodies(mAb)	11hrs
V	UNIT – V Biotechnology – III (Applications of Animal Biotechnology). Transgenesis: Production of Transgenic animals: sheep and fish Ethical, Legal, Social and Disposable issues of Genetically Modified Organisms Manipulation of reproduction in animals: Artificial Insemination, <i>In vitro</i> fertilization, super ovulation, Embryo transfer, Embryo cloning Applications in Industry: Fermentation: Different types of Fermentation and Downstream processing	8hrs

TEXT BOOKS:

1. B.D.Singh, Biotechnology, Kalyani Publishers, 1998 (reprint 2001)
2. Armugam, A Text Book of Immunology, Saras Publications

REFERENCE BOOKS

1. Immunology by Ivan M. Riott
2. Immunology by Kubey
3. Sree Krishna V. 2005. *Biotechnology –I, Cell Biology and Genetics*. New Age International Publ. New Delhi, India.

Course Delivery method: Face-to-face / Blended.

Course has focused on: Foundation

CO-CURRICULAR ACTIVITIES:

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students
- Visit to research laboratory in any University as part of Zoological tour and exposure and/or hands-on training on animal cell culture.
- Visit to biotechnological laboratory in university or any central/state institutes and create awareness on PCR, DNA finger printing and blot techniques or Visit to a fermentation industry

Weblinks:

<https://www.youtube.com/watch?v=EfNY0aiYRIE>

<https://www.youtube.com/watch?v=R69M7NuBNBA>

<https://www.youtube.com/watch?v=hqs57VsSk7s>

<https://www.youtube.com/watch?v=8rAgLPb85N0>

D.A Kiranmayee

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Krishna Dt. A.P. (Autonomous)**

Semester IV *w.e.f. 2022-2023*

(Model question paper)

Title of the paper: Immunology and Animal Biotechnology

Code – ZOOT01

Time: 3hrs.

max.marks: 75

Draw neat labelled diagrams wherever necessary for sections A and B.

SECTION –A

Answer and FIVE of the following

5x5=25 Marks

1. Describe the structure and function of Lymph node CO1 L1
2. Role of B – cells in immune system CO1 L2
3. Illustrate the endogenous pathway of antigen presentation and process CO2 L3
4. List out the properties of cytokines CO2 L1
5. Explain the process of microinjection in gene delivery CO3 L2
6. Explain the importance of cryopreservation in cell culture CO4 L3
7. Explain the role of natural media in cell culture CO4 L2
8. Mention the significance of superovulation in animal husbandry CO5 L4

SECTION – B

Answer the following questions

5X10=50 Marks

9. Explain the different factors contributing for innate immunity. CO1 L1

Or

List out the different types of vaccines.CO1 L1

10. Describe the structure and function of different types of immunoglobulin. CO2 L2

Or

Give an account of the various hypersensitivity reactions. CO2 L2

11. Explain the principle, procedure and advantages of PCR. CO3 L2

Or

Explain in detail about Maxam-Gilbert method of DNA sequencing. CO3 L2

12. What are cell lines? List out their types with examples CO4 L1

Or

Explain in detail about the production of Monoclonal antibodies through Hybridoma TechnologyCO4 L1

13. What is transgenesis? Explain the production of transgenic sheep. CO5 L2

Or

Explain the significance of downstream processing.CO5 L4

PRACTICAL - V

w.e.f. 2022-2023. Title:-Immunology and Animal Biotechnology

Code: ZOOP01

Credits:- (02)

(2hrs/week)MAX.MARKS: 40

Objectives

- Acquaint with immunological techniques vis-à-vis theory taught in the class room
- Interconnect the theoretical and practical knowledge of immunity with the outer world for the development of a healthier life.
- Demonstrate basic laboratory skills necessary for Biotechnology research
- Apply the lab techniques for taking up research in higher studies

SYLLUBUS:

I. IMMUNOLOGY

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
 - a. ELISA - Pregnancy Test and HBs Ag,
 - b. Immunoelctrophoresis - Malarial parasite (cells) and VDRL

II. ANIMAL BIOTECHNOLOGY

1. Preparation of culture media.
2. DNA quantification using by agarosegel electrophoresis (by using Lambda DNA as standard) Method.
2. Techniques: Western Blot, Southern Hybridization,
3. study of the following techniques through
 - A. Paper chromatography
 - B. Thin layer chromatography.
4. Cleaning and sterilization of glass and plastic wares for cell culture.
5. Project work.

SUGGESTED MANUALS

1. Immunology Lab Biology 477 Lab Manual; Spring 2016 Dr. Julie Jameson
2. Practical Immunology A Laboratory Manual; LAP LAMBERT Academic Publishing
3. Manual of Laboratory Experiments in Cell Biology - Edward, G
4. Laboratory Techniques – Plummer

Course Delivery method: Face-to-face / Blended.

Course has focused on: skill development

CO CURRICULAR ACTIVITIES

- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students
- Visit to research laboratory in any University as part of Zoological tour and exposure and/or hands-on training on animal cell culture.
- Visit to biotechnological laboratory in university or any central/state institutes and create awareness on PCR, DNA finger printing and blot techniques or Visit to a fermentation industry

WEBLINKS:

<https://www.youtube.com/watch?v=SvoipyI6IRc>

https://www.youtube.com/watch?v=I_CAmtiwmyQ

<https://www.youtube.com/watch?v=LIGHHueBVVg>

<https://www.youtube.com/watch?v=4srp4ooLYNg>

https://www.youtube.com/watch?v=_rp4mAHeymE

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PAPER – IV

Title: Immunology and Animal Biotechnology

w.e.f.2022-23.

Time:3hrs *Model Question paper (External)*Max.Marks: 40 M.

Paper Code: ZOOP01

I. Analyse the given sample for HBs Ag/HIV/Malarial parasite/VDRL/Ra factor 8 M

Principle : 2M

Procedure : 4M

Result : 2M

III. Identify the sample using paper chromatography technique 10M

Principle : 3M

Procedure : 5M

Result : 2M

IV. Identify, draw labelled diagram and comment on 3x4=12 M

A. Lymphoid organ

B. Histology slide

C. Glass ware for cell culture

Identification : 1M

Diagram : 1M

Notes : 2M

V. Practical Record Book 5 M

VI. Viva 5 M

**SKILL DEVELOPMENT
COURSE OFFERED BY**

THE DEPARTMENT OF ZOOLOGY

DURING -2022-2023

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

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Title of the Paper: **Poultry Farming**

Semester: - II

Course Code	SDCZOOT01	Course Delivery Method	Class Room/Blended Mode - Both
Credits	2	CIA Marks	15
No. of Lecture Hours/Week	2	Semester End Exam Marks	35
Total Number of Lecture Hours	08	Total Marks	50
Year of Introduction :	Year of Offering 2021-2022	Year of Revision – 2022-23	Percentage of Revision: 0%

SKILL DEVELOPMENT COURSE	Course code:SDCZO OT01	2022-2023	I BA, MPCS, MSCS & MCCS, ABC&BZC,
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Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and its role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

COURSE OUTCOMES

CO 1	Understand the basic concepts of poultry farming and apply the same in the management practices of poultry farming.
CO 2	Acquire knowledge in the preparation of project report for banking and insurance.
CO 3	Acquaint with the poultry feed management practices
CO 4	Understand the nutrient requirements for different stages of layers and broilers
CO 5	Gain knowledge in harvesting of eggs and recycling of poultry waste.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	<p>Section I (Introduction to Poultry Farming): General introduction to poultry farming -Definition of Poultry; past and present scenario of poultry industry in India. Principles of poultry housing. Poultry houses, Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers. Preparation of project report for banking and insurance</p>	10
II	<p>Section II (Feed and Livestock Health Management): Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management; Vaccination programme.</p>	10
III	<p>Section III (Harvesting of Eggs and Sanitation): Selection, care and handling of hatching eggs. Egg testing Methods of hatching. Brooding and rearing. Sexing of chicks. Farm and Water Hygiene, Recycling of poultry waste.</p>	10

Co- Curricular Activities suggested:

(4 Hrs)

1. Group discussion & SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online Swayam Moocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"

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(Autonomous)**

Semester –II

w.e.f. 2022-2023 Time: 90 mins (Model question paper)

Title of the paper: Poultry Farming. Code – SDCZOOT01

Max.marks: 35

Section – A

Answer any **Three** questions. Each question carries **five** marks. $3 \times 5 = 15$.

1. Poultry house
2. Broilers
3. Methods of feeding
4. Any two bacterial diseases of poultry
5. Egg testing

Section – B

Answer any **TWO** questions. Each question carries **Ten** marks.

$2 \times 10 = 20$

1. Explain principles of poultry housing in detail, with examples.
2. Write an essay on viral diseases of poultry.
3. Give an account of fungal and bacterial diseases (any two each) of poultry
4. Write an essay on selection, handling and hatching of eggs.

**SEMESTER-II
SKILL DEVELOPMENT COURSE**

to the paper setter

Time: 1¹/₂ hrs

Guide lines

Max.Marks:35

Paper Title: - Poultry Farming.

Paper Code: SDCZOOT01

Note:1. Answer **any THREE** questions out of five in Part-A. Each question carries five marks.3X 5 = 15M.

2. Answer any**TWO** questions out of four in Part-B. Each question carries 10 marks.2 X 10 = 20M.

	PART	Unit –I	Unit – II	Unit-III
5 Marks Questions	A	2	2	1
10 Marks Questions	B	1	2	1
Weightage		20	30	15

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.