ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with B Grade)

Jagannaickpur, Kakinada, East Godavari, AP – 533002

DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY

ZOOLOGY

2023-2024

ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re-Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada, East Godavari, AP – 533002.

ZOOLOGY SEMESTER-I, COURSE 1: (2023-2024)

INTRODUCTION TO CLASSICAL BIOLOGY

Theory **Credits: 4** **5 hrs./week**

Syllabus:

Unit 1: Introduction to Systematics, Taxonomy and Ecology.

1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy.

1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature.

1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.

1.4. Pollution and climate change.

1.5. Unit 2: Essentials of Botany.

2.1. The classification of plant kingdom.

2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, Phyto hormones).

2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.

2.4 Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

3.1. The classification of Kingdom Animalia and Chordata.

3.2 Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders

3.3 Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)

3.4 Economic Zoology – Sericulture, Apiculture, Aquaculture

Unit 4: Cell biology, Genetics and Evolution

4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.

4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene.

4.3. Central Dogma of Molecular Biology.

4.4. Origin of life

Unit 5: Essentials of Chemistry

5.1. Definition and scope of chemistry, applications of chemistry in daily life.

5.2. Branches of chemistry

5.3. Chemical bonds – ionic, covalent, non-covalent – Vander Waals, hydrophobic, hydrogen bonds.

5.4. Green chemistry

ADDITIONAL INPUTS:

1. **Scope of Biology**
2. **Branches of Biology**
3. **Food chain & food web**
4. **Ecological pyramids**
5. **Development of endosperm**
6. **Propagation techniques – cutting & grafting**
7. **Origin of earth**
8. **Periodic Table**

References

1. Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.

2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4th edition. S. Chand publishers, New Delhi, India.

3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.

4. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

6. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.

7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.

8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.

9. Subrata Sen Gupta, 2014. Organic chemistry. 1st Edition. Oxford publishers.

ACTIVITIES:

1. Make a display chart of life cycle of nonflowering plants.
2. Make a display chart of life cycle of flowering plants.
3. Study of stomata

4. Activity to prove that chlorophyll is essential for photosynthesis

5. Study of pollen grains.

6. Observation of pollen germination.

7. Ikebana.

8. Differentiate between edible and poisonous mushrooms.

9. Visit a nearby mushroom cultivation unit and know the economics of mushroom cultivation.

10. Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell

11. Visit to Zoology Lab and observe different types of preservation of specimens

12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow

13. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit

14. List out different hormonal, genetic and physiological disorders from the society

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ZOOLOGY SEMESTER-I, COURSE II: (2023-2024)

INTRODUCTION TO APPLIED BIOLOGY

Theory **Credits: 4** **5 hrs/week**

Syllabus:

Unit 1: Essentials of Microbiology and Immunology

1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch, and Joseph Lister.

1.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.

1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.

1.4. Immune system – Immunity, types of immunity, cells and organs of immune system.

Unit 2: Essentials of Biochemistry

2.1. Biomolecules I – Carbohydrates, Lipids.

2.2. Biomolecules II – Amino acids & Proteins.

2.3. Biomolecules III – Nucleic acids -DNA and RNA.

2.4. Basics of Metabolism – Anabolism and catabolism.

Unit 3: Essentials of Biotechnology

3.1. History, scope, and significance of biotechnology. Applications of biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences.

3.2. Environmental Biotechnology – Bioremediation and Biofuels, Bio-fertilizers and Bio-pesticides.

3.3. Genetic engineering – Gene manipulation using restriction enzymes and cloning vectors; Physical, chemical, and biological methods of gene transfer.

3.4. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salt tolerance). Transgenic animals – Animal and disease models.

Unit 4: Analytical Tools and techniques in biology – Applications

4.1. Applications in forensics – PCR and DNA fingerprinting

4.2. Immunological techniques – Immuno-blotting and ELISA.

4.3. Monoclonal antibodies – Applications in diagnosis and therapy.

4.4. Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.

5.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.

5.3. Introduction, Genomics, Proteomics, types of biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment

5.4. Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench

ADDITIONAL INPUTS

1. Contribution of Yerrapragada Subba Rao to Microbiology
2. Vaccines
3. Life cell bank - stem cell therapy
4. Euphenics.

REFERENCES

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.

2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.

3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.

4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.

5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.

6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.

7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.

8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.

9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.

10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers.

ACTIVITIES

1. Identification of given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganism from pond water.
4. Visit to a microbiology industry or biotech company.

5. Visit to a waste water treatment plant.
6. Retrieving a DNA or protein sequence of a gene'
7. Performing a BLAST analysis for DNA and protein.
8. Problems on biostatistics.
9. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

[**NOTE**: In the colleges where there is availability of faculty for Microbiology and Biotechnology, those chapters need to be handled by microbiology and biotechnology faculty. In other colleges, the above topics shall be dealt by Botany and Zoology faculty]

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ZOOLOGY SEMESTER-II COURSE-3 / (Minor-1) (2023-2024)
ANIMAL DIVERSITY - BIOLOGY OF NON- CHORDATES

Theory Credits: 3 No. of Hrs./Week: 3

SYLLABUS:

UNIT-I

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

1.2 Protozoa General Characters and classification up to classes with suitable examples

1.3 Protozoa Locomotion & Nutrition

1.4 Protozoa reproduction

Activity: Assignment /Seminar on the above

Evaluation: Marks to be awarded for written and oral presentations

UNIT –II

2.1 Porifera General characters and classification up to classes with suitable examples

2.2 Canal system in sponges

2.3 Coelenterata General characters and classification up to classes with suitable examples

2.4 Polymorphism in coelenterates & Corals and coral reefs

Activity: Assignment /Seminar /Quiz/Project on the above

Evaluation: Evaluation of Written part + Evaluation of oral Presentation, Assessment ofstudents in Quiz participation and Ranking - Evaluation of Project Report and oral presentation

UNIT – III

3.1 Platyhelminthes General characters and classification up to classes with suitable examples

3.2 Parasitic Adaptations in helminths.

3.3 Nemathelminthes General characters and classification up to classes with suitable examples

3.4 Life cycle and pathogenicity of Ascaris lumbricoides

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – IV

3.5.Annelida General characters and classification up to classes with suitable examples

3.6.Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economicimportance of vermicompost

3.7.Arthropoda General characters and classification up to classes with suitable examples

3.8. Peripatus - Structure and affinities

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity.

UNIT – V

4.1 Mollusca General characters and classification up to classes with suitable examples

4.2 Pearl formation in Pelecypoda

4.3 Echinodermata General characters and classification up to classes with suitable examplesWater vascular system in star fish

4.4 Hemichordata General characters and classification up to classes with suitable examples Balanoglossus - Structure and affinities

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

ADDITIONAL INPUTS

1. Parasitic Protozoans
2. Systematic Position of Porifera
3. Wuchereria bancrofti
4. Enterobius vermicularis
5. Organic Farming
6. Beneficial insects

Co-curricular activities (suggested)

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification
- Visit to Zoology Museum or Coral Island as part of Zoological tour
- Charts on polymorphism
- Clay models of canal system in sponges
- Plaster-of-Paris model of Peripatus
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Chart on pearl forming layers using clay
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Observation of Balanoglossus for its tubicolous habit

REFERENCE BOOKS:

- L.H. Hyman „The Invertebrates' Vol I, II and V. – M.C. Graw Hill Company Ltd.
- Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca,Echinodermata. Rastogi Publications, Meerut.
- E.L. Jordan and P.S. Verma „Invertebrate Zoology' S. Chand and Company.
- R.D. Barnes „Invertebrate Zoology' by: W.B. Saunders CO., 1986.
- Barrington. E.J.W., „Invertebrate structure and Function' by ELBS.
- P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
- Parker, T.J. and Haswell„A text book of Zoology' by, W.A., Mac Millan Co.London.
- Barnes, R.D. (1982). Invertebrate Zoology, V Edition"

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ZOOLOGY SEMESTER-II COURSE-3 / (Minor-1)
ANIMAL DIVERSITY - BIOLOGY OF NON- CHORDATES LAB (2023-2024)

SYLLABUS:

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

- Protozoa: Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax
- Porifera: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gemmule
- Coelenterata: Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula.
- Platyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium
- Nemathelminths: 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 Anophelesand Culex, Mouthpartsof Housefly and Butterfly.
- Mollusca: Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
- Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva
- Hemichordata: Balanoglossus, Tornaria larva

Dissections:

Pila – Digestive System, Nerve System, Radula.
Prawn –Appendages, Digestive System, Nerve System, Mounting of Statocyst.

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

RFERENCE WEB LINKS:

- https://virtualmicroscopy.peabody.yale.edu/
- https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invetebrates/invertebrates/
- http://www.nhc.ed.ac.uk/index.php?page=24.25.312
- https://biologyjunction.com/invertebrate-notes/

- https://lanwebs.lander.edu/faculty/rsfox/invertebrates/
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

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Jagannaickpur, Kakinada, East Godavari, AP – 533002.
ZOOLOGY SEMESTER-II COURSE 4: (2023-2024)
CELL & MOLECULAR BIOLOGY

Theory **Credits: 3** **3 hrs/week**

SYLLABUS:

UNIT – I Cell Biology-I

2.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroid, mycoplasma

2.2 Electron microscopic structure of animal cell.

2.3 Plasma membrane –Models and Fluid mosaic model

2.4 Transport functions of plasma membrane-Active – passive- facilitated.

Activity: Model preparation of cell/Assignment /Students Seminar /Quiz/Project/Peer teachingon the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – II Cell Biology-II

4.1 Structure and functions of Golgi complex & Endoplasmic Reticulum

4.2 Structure and functions of Lysosomes & Ribosomes

4.3 Structure and functions of Mitochondria & Centriole

4.4 Structure and functions of Golgi complex & Chromosomes

Activity: Model preparation of cell organelles/Assignment /Students Seminar

/Quiz/Project/Peer teaching on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT – III Cell Biology-III

a. Cell Division- mitosis, meiosis

b. Cell cycle – stages- check points- regulation

c. Abnormal cell growth- cancer- apoptosis

d. Bio energetics- Glycolysis-Krebs cycle-ETS

Activity: Model preparation cell division /Assignment /Students Seminar /Quiz/Project/Peerteaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT IV: Molecular Biology-I

4.1 Central Dogma of Molecular Biology

4.2 Basic concepts of - DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)

4.3 Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptionalmodifications (basics)

4.4 Translation – Initiation, Elongation and Termination

Activity: Model preparation of DNA/Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT V: Molecular Biology-II

1. Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes
2. Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)
3. Biomolecules- Protein (Amino acid- structure- properties- biological importance only)
4. Biomolecules- Lipids (Fatty acid- structure - properties- biological importance only)

Activity: Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

ADDITIONAL INPUTS

1. Vacuole, micro tubules cell organelles
2. Amitosis
3. Structure of DNA
4. Genetic code
5. Composition of cytoplasm

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Power point presentation of any of the above topics by students

REFERENCES:

- Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell „Molecular Cell Biology"W.H. Freemanand company New York.
- Cell Biology by De Robertis

- Bruce Alberts, Molecular Biology of the Cell
- Rastogi, Cytology
- Varma & Aggarwal, Cell Biology
- C.B. Pawar, Cell Biology
- Molecular Biology by Frei fielder
- Instant Notes in Molecular Biology by Bios scientific publishers and Viva BooksPrivate Limited
- James D. Watson, Nancy H. Hopkins ”Molecular Biology of the Gene”

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ZOOLOGY SEMESTER-II COURSE-4 (2023-2024)
CELL & MOLECULAR BIOLOGY LAB

Practical **Credits: 1** **2 hrs./week**

SYLLABUS:

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis with prepared slides
3. Observation of various stages of Meiosis with prepared slides
4. Mounting of salivary gland chromosomes of Chironomus
5. Test for carbohydrate in given biological sample (Benedicts test)
6. Test for Protein in given biological sample (Nitric acid test -white ring)
7. Test for lipid in the given biological sample (Saponification test)

RFERENCE WEB LINKS:

- https://cbi-au.vlabs.ac.in/
- https://www.youtube.com/watch?v=xhnUZAyNdQk
- https://www.youtube.com/watch?v=l8LXQq5_VL0
- https://www.labster.com/simulations
- https://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php
- https://virtual-labs.github.io/exp-analysis-of-carbohydrates-au/procedure.html
- https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx_simulation:1
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A)

(Re-Accredited NAAC with 'B' Grade)

KAKINADA, EAST GODAVARI, A.P, 533002.

ZOOLOGY SYLLABUS – SEMESTER III (2023-2024)

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

HOURS:60 **Credits:4 Hrs./Wk:4** **Max. Marks:100**

Syllabus

Unit – I Cell Biology

1. Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
2. Electron microscopic structure of animal cell.
3. Plasma membrane –Models and transport functions of plasma membrane.
4. Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes.

5.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 suitablediagrams)

2. Need not study cellular respiration under mitochondrial functions)

Unit – II Genetics - I

2.1 Mendel's work on transmission of traits

2. 2 Gene Interaction – Incomplete Dominance, Co-Dominance, Lethal Genes

2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics) and Blood group inheritance.

2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)

2. 5 Sex linked inheritance (X-linked, Y-linked &XY-linked inheritance

Unit – III Genetics - II

3.1 Mutations & Mutagenesis

3.2 Chromosomal Disorders (Autosomal and Allosomal)

3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)

3.4 Basics on Genomics and Proteomics

Unit IV: Molecular Biology

4.1 Central Dogma of Molecular Biology

4.2 Basic concepts of -

- DNA replication – Overview (Semi-conservative mechanism, Semi- discontinuous mode, Origin & Propagation of replication fork)
- Transcription in prokaryotes – Initiation, Elongation and Termination, Post transcriptional modifications (basics)
- Translation – Initiation, Elongation and Termination
- Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

Unit - V

4.1 Origin of life

4.2 Theories of Evolution: Lamarckism, Darwinism, Germ Plasm Theory,Mutation Theory

4.3 Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

4.4 Forces of Evolution: Isolating mechanisms, Genetic Drift, NaturalSelection, Speciation

Additional Inputs:

1. Role of Mendel's laws in the production of Hybrids
2. Bombay Blood Group.
3. Structure of DNA
4. Types of DNA
5. Origin of Earth

Co-curricular activities (Suggested):

2 Model of animal cell

3 Working model of mitochondria to encourage creativity among students

4 Photo album of scientists of cell biology

5 Charts on plasma membrane models/cell organelles

6 Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity

7 Observation of blood group inheritance in students, from their parents and grand parents

8 Karyotyping and preparation of pedigree charts for identifying diseases in familyhistory

9 Charts on chromosomal disorders

10 Charts on central dogma/lac operon/genetic code

11 Model of semi-conservative model of DNA replication

12 Model of tRNA and translation mechanism

13 Power point presentation of transcription or any other topic by students

14 Draw geological time scale and highlight important events along the time

15 Chart on industrial melanism to teach directed selection, Darwin"s finches to teach

genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

16 Chart on industrial melanism to teach directed selection, Darwin‟s finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

REFERENCES:

3 Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell „Molecular Cell Biology" W.H.Freeman and company New York.

4 Cell Biology by De Robertis

5 Bruce Alberts, Molecular Biology of the Cell

6 Rastogi, Cytology

7 Varma & Aggarwal, Cell Biology

8 C.B. Pawar, Cell Biology

9 Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIIIEdition. Wiley India.

10 Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wileyand Sons Inc.

11 Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.

12 Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. BenjaminCummings.

13 Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction toGenetic Analysis. IX Edition. W. H. Freeman and Co.

14 Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing

15 Molecular Biology by freifielder

16 Instant Notes in Molecular Biology by Bios scientific publishers and Viva BooksPrivate Limited

17 Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers

18 Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.

19 Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.

20 Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.

21 James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene"

22 Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.

23 Gupta P.K.,Genetics

ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)
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Jagannaickpur, Kakinada, East Godavari, AP – 533002
Semester-III, Paper-III (2023-2024)
(CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION) PRACTICAL SYLLABUS

Syllabus

1. Cell Biology

a. Preparation of temporary slides of Mitotic divisions with onion root tips

b. Observation of various stages of Mitosis and Meiosis with prepared slides

c. Mounting of salivary gland chromosomes of *Chironomus*

2. Genetics

a. Study of Mendelian inheritance using suitable examples and problems.

b. Problems on blood group inheritance and sex-linked inheritance.

c. Study of human Karyotypes (Down's syndrome, Edwards syndrome, Patau's Syndrome, Turner's syndrome and Klinefelter's syndrome).

3. Evolution

a. Study of fossil evidences.

b. Study of homology and analogy from suitable specimens and pictures.

c. Phylogeny of horse with pictures.

d. Study of Genetic Drift by using examples of Darwin's finches(pictures).

e. Visit to Natural History Museum and submission of report.

REFERENCE BOOKS:

1. Burns GW. 1972. *The Science of Genetics. An Introduction to Heredity.* Mac Millan Publ. Co. Inc.
2. Gardner EF. 1975. *Principles of Genetics.* John Wiley & Sons, Inc. New York.
3. Harth and Jones EW. 1998. *Genetics – Principles and Analysis.* Jones and BarHett Publ. Boston.
4. Levine L. 1969. *Biology of the Gene.* Toppan.

5. Pedder IJ. 1972. *Genetics as a Basic Guide*. W. Norton & Company, Inc.
6. Rastogi VB. 1991. *A Text Book of Genetics.* Kedar Nath Ram Nath Publications, Meerut, Uttar Pradesh, India.
7. Rastogi VB. 1991. *Organic Evolution.* Kedar Nath RamNath Publications, Meerut, Uttar Pradesh, India.
8. Stahl FW. 1965. *Mechanics of Inheritance.* Prentice-Hall.
9. White MJD. 1973. *Animal Cytology and Evolution.* Cambridge Univ. Press.

ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)
(Re- Accredited by NAAC with 'B' Grade)
Jagannaickpur, Kakinada, East Godavari, AP – 533002
ZOOLOGY-Semester-IV, Paper-IV (2023-2024)

ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Credits:4 Hrs/Wk:4

Syllabus

UNIT I:

Animal Physiology -I: Process of digestion and assimilation, Respiration - Pulmonary ventilation, transport of oxygen and CO_2, (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.

UNIT II:

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.

UNIT III:

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.

UNIT IV:

Cellular Metabolism –II: Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis, Lipid Metabolism – Synthesis of fatty acids, β-oxidation of palmitic acid Protein metabolism - Transamination, Deamination and Urea Cycle.

UNIT V:

Embryology: Gametogenesis, Fertilization, Types of eggs, Types of cleavages, Development of Frog up to formation of primary germ layers

Additional Inputs:

1. Classification of animals based on Feeding habits
2. Excretory Products.
3. Structure and types of Neurons,
4. Types of muscles
5. Structure of Fructose
6. Sucrose

Co-curricular activities (Suggested)

1. Chart on cardiac cycle, human lung, kidney/nephron structure etc.
2. Working model of human / any mammalian heart.
3. Chart of sarcomere/location of endocrine glands in human body
4. Chart affixing of photos of people suffering from hormonal disorders
5. Student study projects such as identification of incidence of hormonal disorders in the local primary health centre, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
6. Chart on structures of Biomolecules/types of amino acids (essential and non- essential Chart preparation by students on Glycolysis / Kerb's cycle/urea cycle etc.
7. Model of electron transport chain
8. Preparation of models of different types of eggs in animals
9. Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

REFERENCE BOOKS:

1. Eckert H. *Animal Physiology: Mechanisms and Adaptation.* W.H. Freeman &Company.
2. Floray 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 Balinksy

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 Jaya raj MS. 1989. *Developmental Biology*. Kedar 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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ZOOLOGY PAPER-IV, SEMESTER-IV

ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY PRACTICALS

Credits:1 Hrs./Wk:2 Max.Marks:50

Syllabus

1. Animal Physiology
   a. Qualitative tests for identification of carbohydrates, proteins and fats.
   b. Study of activity of salivary amylase under optimum conditions.
   c. T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage.
   d. Differential count of human blood.
2. Cellular metabolism
   a. Estimation of total proteins in given solutions by Lowry's method.
   b. Estimation of total carbohydrate by Anthrone method.
   c. Qualitative tests for identification of ammonia, urea and uric acid
   d. Protocol for Isolation of DNA in animal cells
3. Embryology
   a. Study of T.S. of testis, ovary of a mammal
   b. Study of different stages of cleavages (2, 4, 8 cell stages)
   c. Construction of fate map of frog blastula

REFERENCE BOOKS:

i. Harper's Illustrated Biochemistry
ii. Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley &sons. Inc.
iii. Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
iv. Laboratory techniques by Plummer.

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ZOOLOGY- PAPER-V SEMESTER-IV (2023-2024)

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY SYLLABUS

Credits:4 Hrs/Wk:4

Syllabus:

UNIT I:

Immunology – I (Overview of Immune system): Introduction to basic concepts in Immunology, Innate and adaptive immunity, Vaccines and Immunization programme, Cells of immune system, Organs of immune system

UNIT II: Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)

Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvant; Factors influencing immunogenicity

Antibodies: 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

UNIT III:

Techniques: Animal Cell, Tissue and Organ culture media: Natural and Synthetic media, Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); 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 (MAbs).

UNIT IV:

Applications of Animal Biotechnology: 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.

Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, fish;

applications Manipulation of reproduction in animals: Artificial Insemination, *In-vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning.

UNIT V:

PCR: Basics of PCR.

DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing (2hrs) **Hybridization techniques**: Southern, Northern and Western blotting DNA fingerprinting: Procedure and applications.

Applications in Industry and Agriculture: Fermentation: Different types of Fermentation and Downstream processing.

Agriculture: Monoculture in fishes, polyploidy in fishes.

Additional Input:

1. Autoimmune disorders
2. Immunodeficiency disorders
3. Anti-venom
4. Recombination in pathogens
5. CRISPER technology

Co-curricular activities (suggested)

1. Organizing awareness on immunization importance in local village in association with NCC and NSS teams.
2. Charts on types of cells and organs of immune system
3 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
4 Visit to research laboratory in any University as part of Zoological tour and exposure and/ or hands- on training on animal cell culture.
5 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 or Visit to a local culture pond and submit report on culture of fishes etc.

REFERENCE BOOKS:

1. Immunology by Ivan M. Riott
2. Immunology by Kubey
3. Sree krishna V. 2005. *Biotechnology –I,*
4. *Cell Biology and Genetics.* New Age International Publ. New Delhi, India.

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ZOOLOGY PAPER-V SEMESTER-IV
IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY
PRACTICALS (2023-2024)

Credits:4 Hrs /Wk:4 Max. Marks: 50

Syllabus

1. 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
   - ELISA
   - Immune electrophoresis

2. Animal biotechnology

5. DNA quantification using DPA Method.
6. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
7. Separation, Purification of biological compounds by paper, Thin-layer and Column chromatography
8. Cleaning and sterilization of glass and plastic wares for cell culture.
9. 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
4. Laboratory Techniques by Plummer

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ZOOLOGY- SEMESTER-V PAPER-6A (2023-2024)

SUSTAINABLE AQUACULTURE MANAGEMENT

Credits: 4 Hrs/Wk: 4

Syllabus

UNIT I:

1.1. Present status of Aquaculture – Global and National scenario.

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

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

1.4 Design and construction of fish and shrimp farms.

UNIT II:

2.1 Functional classification of ponds – head pond, hatchery, nursery ponds

2.2 Functional classification of ponds -rearing, production, stocking and quarantine ponds

2.3 Need of fertilizer and manure application in culture ponds

2.4 Physico-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO_2 and nutrients)

UNIT III:

3.1 Induced breeding in fishes

3.2 Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing /desilting, predators, weeds and algal blooms and their control, Liming and fertilization)

3.3 Culture of Indian major carps - Stocking management

3.4 Culture of Indian major carps - post-stocking management

UNIT IV:

4.1 Commercial importance of shrimp & prawn.

4.2 Macrobrachium rosenbergii- biology, seed production.

4.3 Culture of L. vannamei – hatchery technology and culture practices.

4.4 Mixed culture of fish and prawns.

UNIT V:

5.1 Viral diseases of Fin Fish & shell fish.

5.2 Fungal diseases of Fin & Shell fish.

5.3 Bacterial diseases of Finfish & Shell fish

5.4 Prophylaxis in aquaculture.

Additional Inputs:

1. Future scenario of aquaculture
2. Need of liming of pond
3. Sources of seed for aquaculture practices
4. Recent pathogens affecting the aquaculture farms

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 & Sons Inc.1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company.
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/x670 8e06.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

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ZOOLOGY- PAPER-6A SEMESTER-V (2023-2024)
SUSTAINABLE AQUACULTURE MANAGEMENT PRACTICAL SYLLABUS

Credits: 1 **Hrs/Wk: 2** **Max Marks: 50**

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 practical lab 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)

LAB REFERENCES

7.1 Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company

7.2 http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x67 08e06.htm

7.3 http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf

7.4 https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and- control-fishery/871

Web resources suggested by the teacher concerned and the college librarian including reading material

Co-Curricular Activities

1. **Mandatory:(**Student training by teacher in field skills: Total 15 hrs., Lab:10 + field 05)

   a. For Teacher: Training of students by the teacher in laboratory/field fornotlessthan15 hours on Breeding- Induced breeding in carps -hatchery technology of L. vannamei- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory

   b. 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.

   c. Max marks for Fieldwork/Project work Report: 05.

   d. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.

   e. (IE). Unit tests.

2. Suggested Co-Curricular Activities

   a. Preparation of Model/Charts of Cultivable species of fin fish shell fish

   b. Preparation of Model/Chart of Ideal fish Pond- with the standards prescribed.

c. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village).
d. Preparation of Model – charts of Fin /Shell fish Diseases with eco-friendly material.
e. Assignments, Group discussion, Seminar, Quiz, Collection of Material, Video preparation etc., Invited lecture.

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Semester: V (Skill Enhancement Course - Elective), Paper-7A (2023-2024)

POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

Credits: 4 Hrs/Wk: 4

SYLLABUS:

UNIT I: Handling and Principles of fish Preservation

1. 1 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, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.

UNIT II: Methods of fish Preservation

2.1 Traditional methods - sun drying, salt curing, pickling and smoking.

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

UNIT III: Processing and preservation of fish and fish by-products

3.1 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.

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

UNIT IV: Sanitation and Quality control

1.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

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

UNIT V: **Quality Assurance, Management and Certification**

5.1. 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.

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

Additional inputs:

1. Impact of preservatives in quality of preserved fish

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-Leaarningdownload3_new.aspx?Degree_Id=03

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Semester: V (Skill Enhancement Course - Elective), Paper-7A (2023-2024)

POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES PRACTICALS

Credits: 1 Hrs/Wk: 2

Practical (Laboratory) Syllabus:

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products
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 isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet
7. Corrective action procedures in processing of fish- flow chart- work sheet preparation

(** Refer the following web sites for complete procedure method and estimations of above listed practicals)

REFERENCES:

2 Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications

3 https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03

4 https://vikaspedia.in/agriculture/fisheries/post-harvest-and-marketing/processing-in- fisheries/fermented-products

5 https://krishi.icar.gov.in/jspui/bitstream/123456789/20500/1/Fermentation%20technology%2 0for%20fish.pdf

6 http://jebas.org/00200620122014/Abujam%20et%20al%20JEBAS.pdf

7 https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic

8 %20drying%20and%20packing%20of%20fish.pdf

9 https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic

10 %20drying%20and%20packing%20of%20fish.pdf

11 https://agritech.tnau.ac.in/fishery/fish_byproducts.html

12 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352841/

13 http://www.fao.org/3/i1136e/i1136e.pdf

14 http://www.fao.org/3/x5989e/X5989e01.htm#What%20is%20sensory%20assessment)

Web resources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities

1 **Mandatory:** *(Lab/field training of students by teacher (lab 10 + field 05):*

1. For Teacher: Training of students by the teacher in laboratory/fieldfornotlessthan15hourson 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,

2 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.,

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Zoology Semester-V Paper-6B (2023-2024)

LIVE STOCK MANAGEMENT-I (BIOLOGY OF DAIRY ANIMALS)

Credits: 4 Hrs/Wk: 4

Syllabus

UNIT I: Livestock census; Breeds of Dairy cattle, Buffaloes and Goats. Indigenous, Exotic and Crossbred Cattle breeds.

UNIT II: Anatomy of Udder; Development of udder; Lactogenesis and Galactopoises; Letdown of milk.

UNIT III: Artificial insemination; Estrous cycle; Symptoms of heat in cows and buffaloes. Conception, Pregnancy diagnosis in cattle. Multi ovulation and embryo transfer technique. Cloning.

UNIT IV: Economic traits of Dairy cattle. Methods of selection of dairy animals.

UNIT V: Systems of Dairy cattle breeding. Inbreeding, out breeding, Cross breeding, Grading up. Breeding systems (Cross breeding of cattle and grading up of buffaloes).

Additional Inputs:

1. Medicinal importance of indigenous breed
2. Factors affecting the quality of milk
3. Constraints in rearing exotic breeds
4. Advanced trends in breeding Technology

REFERENCES:

1. Textbook of Animal Husbandry-GC Banerjee
2. Handbook of Animal Husbandry –ICAR Edition
3. Principles and practices of Dairy Farm–Jagdish Prasad

Web resources:

1. http://ecoursesonline.iasri.res.in/course/index.php?categoryid=42
2. https://vetsebooks.blogspot.com/p/e-books.html
3. https://www.basu.org.in/study-materials/veterinary-science/
4. https://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeds-of-cattle-buffalo

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Zoology Semester-V Paper-6B (2023-2024)

LIVESTOCK MANAGEMENT-I (BIOLOGY OF DAIRY ANIMALS) PRACTICAL

Credits: 1 Hrs/Wk: 2 (Max. Marks: 50

Practical (Laboratory) Syllabus:(30hrs)

- Points dairy cow. (Explanation with observation of charts- Model evaluation to be performed by the student in the laboratory)
- Identification of different breeds of dairy cattle and buffaloes. (Observation of Charts of breeds in the laboratory- at least 3 breeds should be identified by the students in their locality with video, photo)
- Male and female reproductive systems of cow – Model/ Chart (Student has to draw a labeled diagram of the male and female reproductive systems of cow – acquire skill to identify the parts).
- Symptoms of heat in cow (Study and Understanding the physiological symptoms during heat).
- Artificial in semi nation (Flow chart of implements – Procedure- precautions)
- Pregnancy diagnosis in cattle.
- Study comparative merits of cows and buffaloes; zebu and cross bred cows (Examination of merits

Lab References:

1. Principles and practices of Dairy Farm–Jadish Prasad
2. Dairy cow points: https://www.icar.org/Guidelines/05-Conformation-Recording.pdf
3. Pregnancy test protocol: https://cgspace.cgiar.org/bitstream/handle/10568/109408/Milk%20testing%20lab%20protoco l.pdf?sequence=1&isAllowed=y

Co-Curricular Activities

1. **Mandatory**:*(Lab/ field training of students by teacher :(lab:10 + filed: 05):*
2. For Teacher: Training of students by the teacher in laboratory/field fornotlessthan15hoursonprinciples and practices of dairy industry- breeds –artificial insemination- reproductive behavior of cows etc. as per the syllabus above.

3. For Student: Students shall individually visit to any of the nearby cattle rearing centers/ veterinary hospital/Raithu Bharosa Kendra and make observations of the procedure and quality enhancement activities and submit a handwritten Fieldwork/Project work Report in 10pages.
4. Max marks for Fieldwork/Project work Report: 05.
5. Suggested Format for Fieldwork/Project work Report: *Title page, student details, index page,details of place visited, observations made, findings and acknowledgements*
6. (IE)Unit tests,

Suggested Co-Curricular Activities

1. Collection of various cattle breed images from the web to prepare a album
2. Visit the sites of Veterinary colleges in India and preparation of brief report on the videos and content/ employment details
3. Sketch a model dairy farm with details
4. Invited lecture and presentation on related topics by experts

Seminar, Assignment, Group discussion. Quiz, Collection of Material, invited lecture, Video preparation etc.

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Zoology Semester-V Paper-7B (2023-2024)

LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT)

Credits: 4 Hrs/Wk: 4

Syllabus

UNIT I:

Systems of Housing of Dairy cattle- Loose Housing and Conventional Dairy Barns. Drawing of layouts for dairy cattle dwellings; Criteria for selecting site for establishing Dairy farm buildings; Water requirement of dairy animals.

UNIT II:

Management of different classes of Dairy animals- Milk producing animals, pregnant animals dry animals, heifers and calves. Management practices for Dairy farm; Identification, Dehorning, Castration, Deworming, Vaccination, Disinfection, and Milking.

UNIT III:

Pasteurization of milk: Definition, objects of pasteurization, objections to pasteurization, Principles of heat exchange. Methods of pasteurization: LTLT, HTST and Uperization.

Sterilization of milk. Homogenization: Factors influencing homogenization

UNIT IV:

Market milk: Toned milk, double toned milk, Reconstituted milk, Standardized milk and full cream milk– Standards and methods of manufacture.

UNIT V:

Cream: Types of cream, composition, methods of cream separation, gravity and centrifugal methods, types of cream separators, factors affecting fat losses in skim milk and fat percentage in cream.

Additional Inputs:

1. Feed management based on the breed what we are wearing

2. Management of bull or Bullock

3. Fate of milk after pasteurization

4. Tetra Pack milk

5. Different varieties of Milk products

REFERENCES:

1. Textbook of Animal Husbandry-G C Benarjee
2. Handbook of Animal Husbandry –ICAR Edition
3. Principles and practices of Dairy Farm–Jagdish Prasad
4. http://ecoursesonline.iasri.res.in/course/index.php?categoryid=42
5. https://vetsebooks.blogspot.com/p/e-books.html
6. https://www.basu.org.in/study-materials/veterinary-science/
7. https://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeds-of-cattle-buffalo

ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with B Grade)

Jagannaickpur, Kakinada, East Godavari, AP – 533002

Zoology Semester-V Paper-7B (2023-2024)

LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT) PRACTICAL

Credits: 1 Hrs/Wk: 2

Practical (Laboratory) Syllabus :(30hrs) (Max.50Marks)

1. Dairy Farm layout (In the laboratory student has to sketch a dairy farm with all its components)
2. Identification of cows (students have to identify the breeds of cows form the images/charts – have to identify any two breeds in the vicinity of the college/ their locality).
3. Dehorning of calves: (Method - protocol- precautions)
4. Castration of bulls (Method – Apparatus- Time-importance)
5. Deworming of dairy cattle: (Schedule – method- benefits)
6. Pasteurization of milk (Batch Method- procedure- Observation)
7. Sterilization of milk (In bottle sterilization- procedure – protocol)
8. Cream separation (By gravity method- procedure- hands on experiment)

Lab References

1. Handbook of Animal Husbandry –ICAR Edition
2. Dairy farm layout : https://www.youtube.com/watch?v=dmukHUEUvKc
3. Dehorning procedure : http://www.omafra.gov.on.ca/english/livestock/dairy/facts/09-003.htm
4. Castration of bulls: https://vikaspedia.in/agriculture/livestock/general-management-practices- of-livestock/castration-of-ruminants
5. Deworming: https://kvk.icar.gov.in/API/Content/PPupload/k0347_10.pdf
6. Pasteurization of milk : http://www.jnkvv.org/PDF/08042020170652part%203.pdf
7. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1690
8. Cream separation: http://ecoursesonline.iasri.res.in/mod/page/view.php?id=147910

Web resources suggested by the teacher concerned and the college librarian including reading material.

Co-Curricular Activities

1. **Mandatory:** *(Lab/field training of students by teacher; lab 10+ field :05)*

1. For Teacher: Training of students by the teacher in laboratory and filed for not less than 15 hours on skills of dairy management – housing-management of dairy animals of various stages- procedure of preparation of marketable milk with procedures like sterilization, pasteurization, and other techniques)
2. For Student: Student shall (individually) visit to nearby dairy farm- house hold cattle rearing – make observations on aspects like housing – management – feed- milk- revenue- breed selection- qualities of breed –etc. A handwritten Fieldwork/Project work Report to be submitted in the given format.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work Report: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.*

5. (IE)Unit tests.

2. Suggested Co-Curricular Activities

- Sketch model dairy house with details
- Web resources on Protocols in the management of stages of cattle
- Properties of varieties of milk from the market observation
- Assignment, Seminar, invited lecture, Group discussion. Quiz, Collection of Material, Video preparation etc.