SANT GADGE BABA AMRVATI UNIVERSITY AMRAVATI

Curriculum Scheme for Second year B. Sc II. Sem III & Sem IV (Zoology)																
									Examination and Evaluation Scheme							
Sr. no.	Course category	Subject code no.	Subject/Course	Credit	Teaching and Learning Scheme			Hours/ Week	Maximum Marks					MinimumPassing		
					Lectures	Tutorial	Practical		Theory		Practical		Total Marks	Marks	Grade	
									Theory + MCQ (EXT)	SEM (Int)	Internal	External				
	Semester -III															
1.	B.Sc.	DSC-3-03S	Zoology	4.5	06	---	----	06	80	20	--	--	100	40	p	
		Practical for DSC-3	Zoology	2.25	---	-----	06	04	----	----	25	25	50	25	P	
	Semester -IV															
2.	B.Sc.	DSC-4-04S	Zoology	4.5	06	---	----	06	80	20	--	--	100	40	p	
		Practical for DSC-4	Zoology	2.25	---	-----	06	04	----	----	25	25	50	25	P	

Name of the Programme: B.Sc. II **Class: Part 3S**

Semester: III DSC-3-03S **Subject: Zoology**

Name of the course (Paper): Cell Biology and Developmental Biology

Course Outcomes Code: COs-03

About the course

The course is a walk for the Bachelor's degree through the amazing diversity of living organisms from simple to complex. The course makes a detailed knowledge of cell structure and functions. It explains the types, mechanism and significance of cell division. It also deals with the development of organism and how organism developed from single cell to multicellular organism.

COs:

Upon completion of this course successfully, students would be able to

1. Describe the structure and function of cellular organelles.
2. Describe various mode of cellular transport.
3. Compare active transport with passive transport.
4. Describe structure of chromosomes.
5. Differentiate between various types of chromosomes.
6. Define the basic concept of developmental biology, cell division, embryogenesis and emergence of adult organisms.
7. Describe zygote formation and different stages of embryonic development in frog and chick.

UNIT-I:

1. Plasma membrane: Sandwich model, Unit Membrane Model and Fluid-mosaic Model.
2. Functions of Plasma membrane: Transport across membranes, active transport, passive transport, facilitated transport.
3. Exocytosis, Endocytosis, Phagocytosis and Pinocytosis.
4. Structure of Nucleus and nucleolus.
5. Chromatin: Euchromatin and Heterochromatin.

UNIT-II:

1. General organization of Eukaryotic chromosomes.
2. Nucleosome; Solenoid model.
3. Types of Chromosomes based on position of centromere.
4. Giant chromosomes- Polytene and Lampbrush Chromosome.
5. Functions of Chromosomes.

UNIT-III:

1. Endoplasmic reticulum: Ultrastructure, Types and Functions.
2. Golgi complex: Ultrastructure and Functions.

3. Ribosome: Types (70S and 80S), Ultrastructure (Stoffler and Wittmann's model only); functions.
4. Lysosomes: Polymorphism, Ultrastructure, and functions.
5. Mitochondria: Ultrastructure and functions.

UNIT-IV:

1. Mitosis and its significance.
2. Meiosis and its significance.
3. Gametogenesis: Spermatogenesis and oogenesis
4. Fertilization: Types of fertilization.
5. Mechanism of fertilization.

UNIT V:

1. Cleavage, blastulation and gastrulation up to the formation of three germ layers in Frog.
2. Fate map in frog.
3. Cleavage, blastulation and gastrulation up to the formation of three germ layers in chick.
4. Development of Extra embryonic membranes in chick.
5. Significance of Extra embryonic membranes in chick.

UNIT-VI:

1. Placentation in mammals; Types and Functions of Placenta.
2. Parthenogenesis: Types and Significance.
3. Regeneration in invertebrates.
4. Regeneration in vertebrates.
5. Elementary idea, sources, types and use of Stem cells.

LIST OF PRACTICAL BASED ON CELL AND DEVELOPMENTAL BIOLOGY

I) Cell Biology:

1. Use, care and maintenance of microscope.
2. Study of different cell types by permanent slides/ICT Tools/Charts

   (Endothelium, Neuronal, Epithelia, Connective Tissue)
3. Demonstration of mitochondria by using vital staining.
4. Preparation of Polytene chromosome in *Chironomus* or *Drosophila* larva.
5. Preparation of various stages of mitosis.
6. Preparation of various stages of meiosis from suitable material.

II) Developmental Biology:

1. Study of stages of gametogenesis in rat/frog, (Permanent Stained Slides).

2. Study of different of types of animal eggs.

3. Study of developmental stages (Life Cycle) of Cockroach, Housefly, Mosquito, Butterfly, Moth, Frog (Any Four).

4. Study of developmental stages of *Lymnaea*.

5.Developmental stages of frog: Cleavage, blastula, gastrula, neurula, and tadpoles through available resources.

6. Study of chick embryo at different hours of incubation by permanent slides.

7. Study of different types of placenta with suitable histological slides or visual diagrams.

DISTRIBUTION OF MARKS DURING PRACTICAL EXAMINATION

EXTERNAL MARKS

1. Identification and comments on spots 1-4: (2 from Cytology, 2 from Developmental Biology)	08 Marks
2. Cytological Preparation:	08 Marks
3. Comment on given life cycle:	04 Marks
4. Viva-voce:	05 Marks
	Total = 25

INTERNAL MARKS

1. Attendance:	05 Marks
2. Performance:	05 Marks
3. Certified Class record:	05 Marks
4. Study Tour Report:	05 Marks
5. Submission of Charts/Photograph/models on the basis of syllabus:	05 Marks
	Total =25

SKILL ENHANCEMENT MODULE (SEM)

1. **Study of Different Types of Microscopes**
    - Search for literature on internet for different types of microscopes
    - Collect photographs of different types of microscopes.
    - Prepare a list of different types of microscopes available in your college/locality (in PHC/Pathology Laboratory).
    - Prepare a report on working of each microscope and its uses.
    - Submit a report with photographs.

2. **Comparative study of cleavages in different animals.**
    - Select animals with different patterns of cleavage.
    - Search for literature on internet regarding mechanism of each type of cleavage.
    - Collection of photographs of different stages of cleavage.
    - Submit a report.
3. **Study of different types of animal eggs like fish, frog, reptile, birds**
    - Make photographic collection of eggs from above-mentioned groups.
    - Study morphological features of eggs.
    - Study the egg-laying pattern based on data collected/ from internet.
    - Study the developmental stages from photographs.
4. **Study of developmental stages of (life cycle) insects not included in syllabus**
    - Search for information on internet.
    - Study the life cycle of a holometabolous and a hemimetabolous insect.
    - Photographic collection of life cycle stages.
    - Prepare a chart of life cycles.
    - Prepare report and submit.
5. **Comparative study prokaryotic and eukaryotic cell.**
    - Procure resources such as reference books and internet data on cell biology.
    - Describe the structure of a prokaryotic and a eukaryotic cell.
    - Describe the structure and function of various cellular organelles.
    - Describe the differences between prokaryotic and eukaryotic cells.
    - Prepare a model of prokaryotic and eukaryotic cell.
6. **Study of giant chromosomes.**
    - Collect available *Chironomus* larvae/Prepare a culture of Drosophila.
    - Prepare a slide of polytene chromosome.
    - Perform photomicrography.
7. **To study all aspects of plasma membrane.**
    - Search for different models of plasma membranes by using the latest resources.
    - To make a chart / model showing the functions of the plasma membrane.
    - Create a chart / model of how exchange of various substances takes place in and out of the plasma membrane.

8. **Studying eukaryotic chromosomes with the help of models or charts**
    - Model-assisted replication of eukaryotic chromosomes.
    - Creating a chart or model showing the types of chromosomes.
    - Constructing a model/chart showing the function of chromosomes.

9. **Study of Cell Division**
    - Prepare slides showing different types of stages of mitosis and observe under microscope.
    - Take photographs using a mobile phone and submit.
    - Prepare a slide of meiotic stages, focus under a microscope.
    - Take photographs using a mobile phone and submit.

10. **Study of Regeneration in Vertebrates and Invertebrates**
    - Survey your college campus, surrounding area and near forest.
    - Prepare a list of vertebrates and invertebrates showing regenerative capacity with photographs, and submit.