

Department of Higher Education, Govt. of M.P.
Under Graduate Syllabus for B.Sc.(Bio) 3 years
As recommended by Central board of Studies in Zoology
Class - B.Sc. I year (Session 2021-22)

Theory Syllabus			
Part A Introduction			
Programme- Certificate Course	Class: B.Sc	Year: I Year	Session: 2021- 2022
Subject: Zoology			
1.	Course Code	S1-ZOOL2T	
	Course Title	Cell Biology ,Reproductive biology and developmental biology(Paper 2)	
	Course Type (Core Course/Elective/Generic Elective/Vocational..)	Core Course	
	Pre-requisite (if any)	To study this course a student must have had the subject Biology in 12 th Class	
	Course Learning outcomes (CLO)	<p>Upon completion of the course students should be able to</p> <ol style="list-style-type: none"> 1. Develop deeper understanding of what life is and how it functions at cellular level 2. Understand the nature and basic concepts of Cell biology, Reproductive and Developmental biology. 3. Understand structure and functions of cell membrane and cellular organelles 4. Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare. 5. Understand the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multi-cellular organisms. 6. Understand about the evolutionary development of various animals. 	

6	Credit Value	4	
7	Total Marks	MM 25+75	Min Passing Marks 33

Part B Content of the course		
Total No. of Lectures – Tutorials- Practical (in hours per week): 2hours per week		
L-T-P:		
Unit I	Topics	No. of Lectures
I	<p>Cell Biology</p> <p>1.1 Concept of Prokaryotic and Eukaryotic Cells, difference between Prokaryotic and Eukaryotic Cells</p> <p>1.2 Structure and functions of Plasma membrane</p> <p>1.3 Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, Ribosome and Lysosome</p> <p>1.4 Structure and functions of Nucleus</p> <p>1.5 Structure and functions of Chromosome and special type of chromosomes-Lampbrush and Polytene chromosome</p> <p>1.6 Cell cycle, Mitotic and Meiotic cell division and their significance</p> <p>Keywords/Tags: Prokaryote, Eukaryote, Cell organelles, Chromosomes, Cell Cycle</p>	13
II	<p>Reproductive Biology</p> <p>1.1 Structure of Male reproductive system of Lepus</p> <p>1.2 Structure of Female reproductive system of Lepus</p> <p>1.3 Histology of Testis, and Ovary of Lepus</p> <p>1.4 Gametogenesis - Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis</p> <p>1.5 Types of Eggs-based on amount and distribution of yolk with examples</p> <p>Keywords/Tags: Reproductive system, Gametogenesis, Sperms, Eggs</p>	13
III	<p>Recent Assisted Reproductive Techniques (ART)</p> <p>1.1 Stem cell-Types and their uses</p>	

	<p>1.2 Gene bank, Sperm bank, Superovulation, Cryopreservation</p> <p>1.3 In Vitro Fertilization (IVF) and Embryo Transfer (ET)), Zygote Intra Fallopian Transfer (ZIFT), Intracytoplasmic Sperm Injection (ICSI), MOET(multiple ovulation Embryo transfer)</p> <p>1.4 Placentation -Types, examples and functions</p> <p>1.5 Placenta Banking-Placenta preservation benefits</p> <p>Keywords/Tags: Gene bank, Sperm bank, Superovulation, IVF, ET, ZIFT, ICSI, Placenta banking</p>	12
IV	<p>Developmental Biology</p> <p>1.1 Fertilization Invertebrates</p> <p>1.2 Embryonic development of frog up to the formation of three germinal layers</p> <p>1.3 Fate map construction in frog.</p> <p>1.4 Metamorphosis of Tadpole Larva</p> <p>1.5 Parthenogenesis</p> <p>Keywords/Tags: Fertilization, Frog embryology. Tadpole metamorphosis, Parthenogenesis</p>	11
V	<p>Embryonic Development of Chick</p> <p>1.1 Structure of hen's egg,</p> <p>1.2 Embryonic Development of chick embryo upto the formation of primitive streaks</p> <p>1.3 Fate map construction in chick</p> <p>1.4 Extra embryonic membranes of Chick: Formation and functions.</p> <p>Keywords/Tags: Hen's egg, Chick embryology, Fate map, Chick Embryo membranes</p>	11

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested readings

1. Suggested readings:

1. Armugam, "A Text Book of Embryology", Saras Publication, 2005.
2. Balinsky, BI, "An Introduction to Embryology", Cengage Learning, 2012.
3. De Robertis, EDP, De Robertis, EMF, "Cell and Molecular Biology", Eighth edition, Lippincott, Williams & Wilkins, Philadelphia, 2006.
4. Gupta, PK, "Cell Biology, Genetics and Evolution", Rastogi
5. Haffner, L, "Human reproduction at a glance", BWL Publication, "Human Embryology", Publications, 2013.
Churchill Livingstone, 2001.
7. Powar, CB, "Cell Biology", Himalaya Publishing House, 2010.
6. Larsen, 8. Rastogi, VB, "Introduction to Cytology", KNRN Publication, 1988.
9. Rastogi, VB, "Animal Distribution and Developmental Biology", KNE 2001.
Publication, 2020.
10. Sastry, KV, Publications, 2018. "Endocrinology and Reproductive Biology",
11. Verma and Agarwal, "A Text Book of Cytology", S. Chand & Co., 1999.
12. Verma, PS, Agarwal, V, K. "Chordate Embryology", S. Chand & Co., 2000
13. Pardesi, K and Dubey, A., "Cell and Developmental Biology", Akhand publi

Suggested equivalent online courses:

1. house, New Delhi, I edition, 2020. 14. <https://academic.oup.com>

15. <https://medineplus.gov>

16. <https://ncni.nlm.nih.gov>

17. <https://zoologylearningpoint.wordpress.com> zoologyresources.com

sted equivalent online courses:

Swayam Online Courses <https://storage.googleapis.com/uniquecourses/online.html>

National Digital Library <https://ndl.iitkgp.ac.in/>

Part B- Content of the Course		
Total No. of Lectures - Tutorials-Practical (in hours per week): 02 hours per week		
L-T-P:		
Unit	Topics	No. of lectures
1.	Spotting related to the cytology Prokaryote and Eukaryote Cell b. Stages of Mitotic cell division c. Stages of Meiotic cell division. d. Lamp brush Chromosome f) Study of Polytene chromosome under Phase Contrast Microscope.	13
2.	Spotting related to Reproductive biology and Embryology a. T.S. Testis of Mammal b. T.S. Ovary of Mammal c. Developmental stages of Frog embryology d. Developmental stages of Chick embryology e) Malaria Antibody Test using ELISA Reader g) Calculation of stages of meiotic cell division under Phase Contrast Microscope	13

3.	Squash preparation of onion root tip to understand the stages of Mitosis	08
4.	Squash preparation of Grasshopper testis to understand the stages of Meiosis	9
5.	Trypan Blue exclusion test of cell viability	8
6.	Squash preparation of salivary gland chromosome from Chironomus larva / Drosophila	9

Keywords/Tags: Stages of cell division, Stages of Embryonic development, Squash Preparation

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Arumam, N. Nair, NC, Leelavathy, S. Pandian, NS, Murugan, T, Jayasurya, "Practical Zoology - Invertebrata", Volume-I. Saras Publication, 2013.
2. Lal, SS. "A Text book of Practical Zoology - Invertebrates", Rastogi Publication, 2016
3. Prakash, M, and Arora, CK. "Laboratory Animals". Anmol Publications, New Delhi, 1998
4. Verma, PS, "A Manual of Practical Zoology - Invertebrates". S. Chand & Co., 2013.
5. Virtual Labs (<https://www.vlab.co.in>)

Part D Assessment and Evaluation		
Suggested Continuous Evaluation Methods; Maximum Marks 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam (UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE): 25	Class Test Assignment/Presentation	15
		10
	Total	25
External Assessments: University Exam : 75 Time:2:00 Hours	Section (A): Three Very Short Questions(50 words Each)	03X03=9
	Section (B): Four Short Questions(200 words Each)	04x09=36
	Section (C): Two Long Questions(500 words Each)	02x15=30
		Total 75
Any remarks/suggestions:		