Attainment of Programme Outcome

M.Sc ZOOLOGY

CO, PO and PSO Mapping

Name of the Course: Cell and Molecular Biology

Blueprint of the question paper	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER I			
Core I	**Cell and Molecular Biology**		
Course Code: 21PZOC11	**Hrs/ Week : 6**	**Hrs/ Sem: 90**	**Credits: 4**

Objectives

- To develop basic knowledge and skills in cell and molecular biology and become aware of the complexity and harmony of the cell
- To gain the comprehensive knowledge on the molecular structure of cells, organelles including membrane structure and its dynamics

Unit I **Cell and Transport Across Cell Membranes**

Molecular organization of cell membrane – molecular models (Unit membrane, Trilaminar and Fluid mosaic) – intercellular junctions - types of transport - diffusion –membrane transport proteins – uniporter catalysed transport –

membrane electrical potential. Active transport by ATP powered pumps. Co - transport by symporters and antiporters.

Unit II **Cell Receptors and Cell Signaling**

Cell signaling – principle of cell signaling - signaling mechanisms - signal receptors - intercellular signaling - cell surface receptors – types - G protein coupled receptors - second messengers (cAMP, IP_3,DAG, cGMP, & Ca^{2+}) - signaling from plasma membrane to nucleus.

Unit III **Chromosome and Genes**

Chromosome structure, Organization of genes in chromosomes – introns and exons – simple, complex and split genes – forms of DNA-A,B,Z - molecular basis of mutation – transition - transversion – frame shift – induction of mutation – repair systems to counteract DNA damage and mutation – post-transcriptional modification.

Unit IV **Cell Organelles, Protein Synthesis and Processing**

Ultrastructure of ribosome – endoplasmic reticulum – Golgi complex, mitochondria. Protein synthesis - translational proof reading. Post translational modification - disulfide bond formation, correct folding, assembly into multimeric proteins and protein glycosylation - O-linked and N-linked glycolysation in endoplasmic reticulum.

Unit V **Cell Division**

Cell division and cell cycle: Mitosis and meiosis, their regulation, cell cycle - control - apoptosis and its regulations - characteristics of cancer cells – causes and onset of cancer – metastasis – proto oncogenes - tumour suppressor genes.

Books for Reference

1. De Robertis, E.D.P. and Robertis E.M.F. Cell *and Molecular Biology 9th International Edition,* Mumbai: K.M. Varghese Company, 1988.
2. David M. Prescott Cells – *Principles of Molecular Structure and Function*. USA: Jones and Bartlett Publishers.1988.
3. Lodish, H., Baltimore D. and Darnell J. *Molecular Cell Biology*. USA : Scientific American Book, Inc.
4. Ajoy Paul. *Text Book of Cell and Molecular Biology*. Kolkata: Books and Allied (P) Ltd. Third Edition. 2011.
5. Bhamrah, H.S. *Molecular Cell biology*. New Delhi: Publications Pvt Ltd. 1995
6. David Freifelder. *Essentials of Molecular Biology*. New Delhi: Narosa Publishing House. 1995.
7. Sivarama Sastry, K., Padmanaban G. and Subramanyam. C. *Text Book of Molecular Biology*. New Delhi : Mac Millan India Limited. 1994
8. Gerald Karp. *Cell Biology*. Mc Graw Hill. Second Edition. 1984.
9. Prakash S. Lohar. *Cell and Molecular Biology*. Chennai: MJP Publishers. 2007
10. Gupta M.L and Jangir, M.L. *Cell Biology Fundamentals and Application*. Jodhpur:

Saraswati Purchit for Student Edition. 2001
11. Rastogi S.C. *Molecular Biology*. New Delhi : CBS Publishers and Distributors Pvt. Ltd., 2006.

Course Outcomes

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe the structure and function of biological membrane including the roles of gradients in energy transduction	1	Re
CO-2	illustrate the structural organization, control and regulation of gene at the transcriptional, post transcriptional level	2	Un
CO-3	outline the mechanisms of cell to cell signaling, including intercellular signaling and second messenger	5	An
CO-4	compare the structure and function of proteins, roles of amino acids in protein folding and protein-protein interactions	5	An
CO-5	examine cell cycle and its regulation, including mitosis and meiosis	4	An
CO-6	evaluate the characteristics, causes and role of genes in cancer	5	Ev

21PZOC11 Programming

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	2	3	2	3	2	3	2	**2.5**	3	3	3	2	3	3	2	2	**2.6**
CO-2	3	3	2	3	3	2	2	2	**2.5**	3	3	3	3	2	3	2	2	**2.6**
CO-3	3	3	3	3	3	2	2	2	**2.6**	3	3	3	2	3	2	2	3	**2.6**
CO-4	3	3	3	2	3	2	2	2	**2.5**	3	3	3	3	3	3	2	2	**2.8**
CO-5	3	3	3	3	3	2	2	2	**2.6**	3	3	3	3	3	2	2	3	**2.8**
CO-6	3	3	3	2	3	2	2	2	**2.5**	3	3	3	3	3	3	3	2	**2.8**
Average	**3**	**3**	**2.8**	**2.5**	**3**	**2**	**2.1**	**2**		**3**	**3**	**3**	**2.6**	**2.8**	**2.6**	**2.2**	**2.3**	
PO Mean									**2.5**	PSO Mean								**2.7**
Strength of PO Correlation				Strong						Strength of PSO Correlation				Strong				

Attainment of Course Outcomes of the M.Sc. Zoology Programme

Course Code	Name of the Course	Course Outcomes															
		Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
		PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
21PZOC11	Cell and Molecular Biology	3	3	2.8	2.5	3	2	2.1	2	3	3	3	2.6	2.8	2.6	2.2	2.3
21PZOC12	Genetics and Evolution	3	3	3	3	2	2	2	2	3	3	2	3	3	3	3	2
21PZOC13	Biochemistry	2.8	2.7	2.7	2.8	2.8	2.5	2.6	2.5	3	2.8	2.8	3	2.7	2.3	2.5	2.6
21PZOC14	Applied Entomology	2.6	2.8	2.8	2.6	2.8	2.6	2.6	2.5	3	2.8	2.6	3	2.6	2.6	3	3
21PZOC21	Animal Physiology	3	3	2.7	3	3	2.5	2.7	2.3	3	3	2.8	3	3	3	2.7	2.5
21PZOC22	Immunology	2.8	2.5	2.8	2.6	2.6	2.3	2.5	2	2.8	3	3	3	2.8	2.2.	2.2	2.5
21PZOC23	Applied Biotechnology	2.6	2.8	2.8	2.6	2.8	2.6	2.6	2.5	3	2.8	2.6	3	2.6	2.6	2.8	2.8
21PZOC24	Microbiology	3	3	3	2.7	3	2.7	2.7	2.8	3	3	3	3	3	2.2	2.3	2.3
21PZOC31	Computational Biology	3	3	2.6	3	3	2.6	2.3	2.6	3	3	2.7	3	3	2.7	2.3	2.7
21PZOC32	Aquaculture Practices and Farm Management	3	3	3	3	3	2	2	2	3	3	3	3	3	2.2	2.2	2
21PZOC33	Developmental Zoology	2.6	2.8	2.8	2.6	2.8	2.6	2.5	2.5	3	2.8	2.8	3	2.6	2.5	2.5	2.5
21PZOC34	Research Methodology and Biotechniques	3	3	2.6	2.8	2.8	2.6	2.3	2.8	3	3	2.8	2.8	2.8	2.7	2.5	2.7
21PZOSS1	Zoology for Competitive	3	3	2.9	3	2.5	2.3	2	2	3	3	3	2.8	3	3	2.7	2.7

	Examination																
21PZOC41	Marine Biotechnology	3	3	2.9	3	2.5	2.3	2	2	3	3	3	3	2.8	2.6	2.1	2
21PZOC42	Conservation Biology	3	3	2.8	3	2.6	2.3	2.8	2.7	3	3	3	3	2.8	3	2.8	2.8
21PZOC43	Commercial Zoology	3	3	3	2.7	3	2.7	2.8	2.6	3	3	3	3	3	2.7	2.8	2.8
21PZOE41	Ornamental Fish Culture	3	3	3	2.7	2.8	2.5	2.7	2.5	3	3	3	3	3	2.5	2.7	2.8
Average Correlation		**2.9**	**2.9**	**2.8**	**2.8**	**2.8**	**2.4**	**2.4**	**2.4**	**3.0**	**3.0**	**2.8**	**3.0**	**2.9**	**2.6**	**2.5**	**2.5**
Mean Overall Score		**2.7**	**The POs and PSOs are strongly correlated with the COs of the programme**														