

M.Sc. (PREVIOUS) ZOOLOGY-2005-06

PAPER-II

**GAMETE AND DEVELOPMENTAL BIOLOGY,
TECHNIQUES AND TOOLS FOR BIOLOGY**

Duration : 3 hours

M.M. 100

UNIT-I

- 1 Differentiation of gonads in mammals.
 - 2 Spermatogenesis:
 - a. Mechanism of sperm formation.
 - b. Structure of sperm.
 - c. Types of sperms
 - 3 Oogenesis:
 - a. Growth of oocyte and vitellogenesis.
 - b. Organization of egg cytoplasm.
 - c. Types of ova.
- UNIT-II**
- 4 Fertilization:
 - a. Pre-fertilization events.
 - b. Biochemistry of fertilization.
 - c. Post fertilization events
 - 5 Early embryonic development:
 - a. Patterns of cleavage
 - b. Blastulation and gastrulation
 - c. Determination-Brief idea of differential gene expression

- d. Fate maps
- e. Morphogenetic movements
- f. Primary embryonic induction
- g. Induction of primitive nervous system
(Spemann's primary organizer)
- h. Competence.

UNIT-III

- 7 Organogenesis:
 - a. Morphogenesis of the brain, neural crest cells and their derivatives.
 - b. Development of eye, heart and alimentary canal with accessory organs.
- 8 Metamorphosis in Amphibia:
 - a. Structural and physiological changes during metamorphosis.
 - b. Endocrine control of metamorphosis.
- 9 Embryonic adaptations:
 - a. Evolution of cleidoic egg - its structural and physiological adaptations.
 - b. Evolution of viviparity.
 - c. Development and physiology of extra-embryonic membranes.
 - d. Development, types and physiology of mammalian

UNIT-IV

- 10 Assays :
 - a. Chemical assays
 - b. Biological assays- in vivo and in vitro assays.
- 11 Principles and uses of analytical instruments- balances, pH meter, colorimeter, spectrophotometer ultracentrifuge and PCR.
- 12 Microscopy : Principles of light transmission, phase-contrast, fluorescence, confocal, scanning and transmission electron microscopes, photomicrography, image analysers.

UNIT-V

- 13 Microbiological techniques
 - a. Media preparation and sterilization
 - b. Inoculation and growth monitoring
 - c. Use of fermentors
 - d. Biochemical mutants and their use
 - e. Microbial assays
- 14 Cryotechniques :
 - a. Cryopreservation for cells, tissues, organisms, gametes and embryos.
 - b. Cryotechniques for microscopy.

REFERENCE BOOKS (LATEST EDITIONS) :

- 1 Austen. C.R. and Short, R.V. Reproduction in animals.
- 2 Schatten and Schatten. Molecular Biology of Fertilization.
- 3 F.T.Longo. Fertilization, Chapman and Hall.
- 4 R.G.Edwards. Human Reproduction.
- 5 Balinsky, An Introduction of Embryology (CBS College Publishers)
- 6 Gilbert : Development Biology (Sinauer)
- 7 Grant : Biology of Developing Systems (Holt Reinhart and Winston)
- 8 John R.W. Masters Ed., Animal Cell Culture - A Practical approach, IRL Press.
- 9 Robert Braun: Introduction to Instrumental Analysis, McGraw Hill International Editions.
- 10 K. Wilson and K.H. Goulding A Biologists Guide to Principles and Techniques of Practical Biochemistry, ELBS Edn.