THIRD SEMESTER:

ZOOL/ 301: COMPARATIVE ANATOMY OF VERTEBRATES

UNIT-I

1. Origin of chordata: Concept of Protochordata
2. Origin and classification of vertebrates
3. Vertebrate morphology: Definition, scope and importance
4. Development, structure and functions of vertebrate integrument and its derivatives (glands, scales, features and hairs)

UNIT-II

5. Respiratory system: Characters of respiratory tissue, external and internal respiration, comparative account of respiratory organs
6. Evolution of heart
7. Evolution of aortic arches and portal systems
8. Blood circulation in various vertebrate groups

UNIT-III

9. Form, function, body size and skeletal elements of the body
10. Comparative account of law suspensorium and vertebral column
11. Comparative account of limbs and girdles
12. Evolution of urinogenital system in vertbrates

UNIT-IV

13. Comparative account of organs of olfaction and taste
14. Comparative anatomy of brain and spinal cord (CNS)
15. Comparative account of peripheral and autonomic nervous system
16. Comparative account of lateral line system

UNIT-V

17. Comparative account of electroreception
18. Comparative account of simple receptors
19. Flight adaptation in vertebrates
20. Aquatic adaptations in birds and mammals

Suggested Readings:

Young, J.Z. life of vertebrates, oxford University Press, London
Young, J.Z. Life of mammals. Oxford University Press, London
Colbert, E.H. Evolution of the vertebrates. John Wiley and Sons Inc. New York.
Kent, C.J. Comparative Anatomy of Vertebrates.
Wostenholng, E.W. and knight, J. (ED.) Taste and Smell in Vertebrates. J& A Churehill, London
Walters, H.A. and Sayles. L.D. Biology of Vertebrates,Macmillon & Co, New York.
Montagna, W. Comparative Anatomy, Clarenden Press, Oxford.
Welchert, C.K. and Presch, W. Elements of Chordate Anatomy. 4th edn. MeGraw Hill Book Co., New York.

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ZOOL/ 302: DEVELOPMENTAL BIOLOGY

UNIT-I

1. Basis concepts of Development: Cell division and the cell cycle, Chromosomal puffs and gene activation, cell commitment and differentiation (Specification, determination, induction competence, differentiation),
2. Morphogen gradients, cell fate, cell potency and morphogenesis
3. Gametogenesis: Origin and migration of primordial germ cells, 2.2 Production of male gamates (Spermatogenesis), 2.3 Gene expression during spermatogenesis and sperm maturation,
4. Production of female gametes (oogenesis) (Previtellogenesis, vitellogenesis and maturation phase in development of amphibian egg), Gene expression during amphibian oogenesis, Ovulation and ovum transport in mammals

UNIT-II

5. Fertilization and early development: Pre fertilization events (sperm penetration of egg and acrosomal reaction, binding of sperm to the egg, Blocks to polyspermy), Biochemistry of fertilization (metabolic activation of egg, penetration of spermatozoa into the egg, union of gametes), Post- fertilization events
6. Establishment of polarity in amphibians and birds
7. Gastrulation and formation of germ layers in animals\
8. Multiple ovulation and embryo transfer technology: In vitro oocyte maturation and super ovulation

UNIT-III

9. Hormonal regulation of ovulation, pregnancy and partuition
10. Hormonal regulation of development of mammary glands and lactation
11. Endocrinology and physiology of placenta
12. Collection and cryo preservation of gametes and embryos

UNIT-IV

13. Teratological effects of xenobiotics on gametes
14. Wolfian lens regeneration
15. Melanogenesis
16. Differentiation and development of gonads

UNIT-V

17. Cell diversification in early embryos, xenopus blastomeres, totipiotency & pleuipotncy
18. Embryonic stem cells, chord-blood cells & their significance
19. Hemopoetic stem cells, formation of blood cells, Stem cells technology
20. Connective tissue cell family

Suggested Readings:

Gilbert, S.F. Developmental Biology, Sinauer Associated Inc, Massachusetts.
Ethan Bier. The Cold Spring. The cold Spring Harbor Laboratory Press, New York
Balinsky, B.J. Introduction to Embryology. Saunders, Philedelphia.
Berril, N.J. and karp, G. Development Biology. McGraw Hill, New York
Davidson, E.H. Gene Activity During Early Development. Academic press, New York.

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COURSES FOR SPECIAL (ELECTIVE) GROUPS:

A. AQUATIC BIOLOGY AND AQUACULTURE

ZOOL. 303 (A) AQUATIC ECOLOGY & RESOURCES

UNIT-I

1. Aquatic ecology: Science and its development
2. Origin and classification of wetlands including lakes
3. Morphology of lakes, reservoirs and ponds
4. Physical chemical and biological characteristics of marine environment

UNIT-II

5. Estuaries and other brackish water environments in India and their faunal importance
6. Physical and chemical characteristics of lakes, ponds and rivers
7. Freshwater biota: Plankton, benthos and macrophytes
8. Food chain, food web, tropic levels and energy flow

UNIT-III

9. Primary productivity in Inland water and method of its determination
10. Degradation of wetland in India and control measures
11. Aquatic resources: Invertebrates and vertebrates
12. Importance and management of aquatic resources in India

UNIT-IV

13. Migration pattern of aquatic animals including aquatic birds
14. Threatened wetlands and endangered aquatic species
15. Aquatic wild life: Habitat and its importance, composition and conservation strategies
16. Aquatic pollution, its causes and control measures

UNIT-V

17. Major sources of pollution in rivers and remedies
18. Biological indicators of water pollution
19. Eutrophication, its impact on water bodies and control measures
20. Aquatic toxicology: Aquatic toxicity, long-term toxicity and chronic toxicity

Suggested Readings:

P.D. Sharma, Fundamentals of Ecology,Rastogi Publication Meerut.
E.P. Odum , Fundamentals of Ecology,Cengage Learning IndiaDelhi.
R.S.K. Barnes, Fundamental of Aquatic Ecosystem, Wiley India New Derhi.
G. Ragothaman , Aquatic Ecology: A Text Book. Agrobios India Jodhpur.

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ZOOL. 304 (A): FISH BIOLOGY & PHYSIOLOGY

UNIT-I

1. Structure and functions of skin and scales, significance of scales in taxonomy
2. Chromatophores: Classification, ultrastructure and functional significance
3. Origin of paired fins and modification of caudal fin
4. Respiratory organs including accessory respiratory organs and respiration in fish

UNIT-II

5. Swim bladder and its functional significance
6. Food, feeding habits and nutrition in fish
7. Digestive system and physiology of digestion in fish
8. Osmoregulatory organs and osmoregulatory mechanisms in fish

UNIT-III

9. Brain of fishes and its functional organization in relation to ecological conditions
10. Lateral line system: Structure, modifications and functional significance
11. Electric organs and their significance
12. Bioluminiscence in fish and its significance
13. Chemical communication in fish

UNIT-IV

14. Neuro-endocrine integration and hypothalamo-hypophysical system in fish
15. Anatomy and physiology of pituitary gland
16. Anatomy and physiology of thyroid gland
17. Pineal organ, internal gland and caudal neurosecretory system

UNIT-V

18. Seasonal cycles of gonads in Indian fish
19. Hormonal and endocrine control of reproduction in fish
20. Development of teleost fish
21. Parental care in fish

Suggested Readings:

Brown, M.E. The Physiology of Fishes, Vol. I & II. Academic Press, New York
Lager, K.F. Bardach, J.E. Miller, R.R. and Passino, D.R.m. Ichthyology, John Wiley & Sons, New York
Hoar and Randall. Fish Physiology Vo.1- 16. Academic Press, New York
Nikolsky, G.V. The Ecology of Fishes. Academic Press, New York.

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