

Paper 8A

Developmental Biology, Environmental Biology and Biotechnology (Theory)

Marks: 75

Time: 3 Hours

- Unit-1:** Patterns of cleavage; Morphogenetic movements (epiboly, invagination, ingression, involution and delamination); Embryonic induction and concept of Organizer; Gastrulation in chick up to formation of three germinal layers.
- Unit 2:** Foetal membranes and types of placenta in mammals; Organogenesis of the vertebrate eye; Regeneration in invertebrates and vertebrates; Teratogenesis and developmental birth defects. Concepts of Ageing.
- Unit - 3:** Salient features of aquatic and terrestrial ecosystems. Liebig's law of limiting factors and Shelford's law of tolerance. Biogeochemical cycles: carbon, phosphorus and nitrogen cycles. Ecological succession. Major Biomes.
- Unit - 4:** Environmental concerns: Radioactive pollution; Biological indicators; Biomagnification; Anthropogenic activity and environment: Ozone depletion; Green house effect and global warming; Acid rains.
Wild life conservation: *In situ* (sanctuaries, national parks and biosphere reserves) and *ex situ* (botanical and zoological gardens, Germplasm Bank).

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Unit - 5 Biotechnology & Genetic Engineering

Introduction to genetic engineering; Restriction enzymes. Cloning vectors: Plasmid, cosmid, λ phage, shuttle vectors; Expression vectors. Introduction in to host cells: Transformation, transduction; Particle gun. Southern blotting; PCR; DNA Fingerprinting; Genomic library and cDNA library; Application of recombinant DNA technology. Ethical issues and Biosafety regulations.

Suggested Readings:

1. Balinsky, B.I. (1981). An introduction to Embryology, 7th Edition. Cengage Learning India.
2. Beeby, A. and Brennan, M. A. (2008). First Ecology - Ecological Principles and Environmental Issues, 3rd Edition, Oxford University Press, India.
3. Brown, T. A. (2006). Gene Cloning and DNA Analysis: An Introduction. Wiley-Blackwell.
4. Cain, M. L., Bowman, W. D. and Hacker, S. D. (2011). Ecology, 2nd Edition. Sinauer Associates, Inc. Publishers
5. Carlson, B. M. (2006). Foundations of Embryology. McGraw Hill Education (India) Ltd.
6. Gilbert, S. F. (2010). Developmental Biology, 9th Edition. Sinauer Associates, Inc. Publishers.
7. Kalthoff, K. (2000). Analysis of Biological Development, 2nd Edition, McGraw-Hill Professional.
8. Kendeigh, F. C. (1984). Ecology with Special Reference to Animal and Man. Prentice Hall Inc.
9. Odum, E. P. (1971). Fundamentals of Ecology, 3rd Edition. W. B. Saunders Company.
10. Odum, E. P. and Barrett, G. W. (2006). Fundamentals of Ecology, 5th Edition, Cengage Learning India.
11. Primrose, S. B. and Twyman, R. (2006). Principles of Gene Manipulation and Genomics, 7th Edition. Wiley-Blackwell.
12. Ratledge, C. (2006). Basic Biotechnology. John Wiley and Sons.
13. Ricklefs, R. E. (2010). Economy of Nature, 6th Edition. W.H.Freeman.
14. Sharma, P. D. (1990). Ecology and Environment, 7th Edition. Rastogi Publications.
15. Shyam, D. and Rosencranz, A. (2001). Environmental Law and Policy in India. Oxford University Press.
16. Stiling, P. D. (2012). Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.
17. Thieman, W. J. and Palladino, M.A. (2008). Introduction to Biotechnology, 2nd edition. Cengage Learning India.
18. Wolpert, L. and Tickle, C. (2011). Principles of Development, 4th Edition, Oxford University Press.

