

Paper 5A

Functional Anatomy, Zoogeography and Adaptations (Theory)

Marks: 75

Time: 3 Hours

- Unit - 1:** Protozoa: Locomotion and nutrition.
 Porifera: Canal and skeletal systems.
 Cnidaria: Polymorphism in *Siphonophora*; Corals and coral reefs.
 Morphological and physiological adaptations of parasitic helminthes.
 Annelida: Excretory system.
- Unit - 2:** Onychophora: General organization and affinities.
 Arthropoda: Types of mouth parts and feeding in insects; Vision in insects.
 Mollusca: Torsion and detorsion in Gastropoda.
 Echinodermata: Comparative study of water vascular system.
- Unit - 3:** Hemichordata: Affinities of *Balanoglossus*
 Protochordata: Affinities of *Amphioxus*.
 Retrogressive metamorphosis in *Ascidia*.
 Agnatha: Comparative study of *Petromyzon* and *Myxine*.
 Pisces: Scales and fins in fishes; Accessory respiratory organs; Migration of fishes.
 Diploï: General characters and affinities.
- Unit - 4:** Amphibia: Parental care.
 Reptilia: Poisonous and nonpoisonous snakes; Poison apparatus and mechanism of biting.
 Aves: Flight adaptations and migration in birds.
 Mammalia: Affinities of Monotremata and Marsupialia; Dentition in mammals.
 Comparative anatomy of kidney in vertebrates.
- Unit - 5:** Zoogeography: Concepts and Zoogeographic realms. Patterns and regulation of behaviour: genetic and hormonal; Colouration and mimicry.
 Adaptations in vertebrates: Aquatic, desert, arboreal, cursorial and deep sea adaptations.

Suggested Readings:

1. Agarwal, V. K. (2010). Animal Behaviour (Ethology). S. Chand & Co.
2. Brusca, R. C. and Brusca, G. J. (2003). Invertebrates, 2nd Edition. Sinauer Associates, Inc. Publishers.
3. Hall, B.K. and Hallgrímsson, B. (2008). Strickberger's Evolution, 4th Edition. Jones and Bartlett Inc.
4. Jordan, E. L. and Verma, P. S. (1992). Invertebrate Zoology. S. Chand Company Ltd.
5. Jordan, E. L. and Verma, P. S. (1993). Chordate Zoology. S. Chand & Co.
6. Kardong, K. V. (2006). Vertebrates: Comparative Anatomy, McGraw Hill Education (India) Ltd.
7. Kotpal, R. L. (2012). Modern Textbook of Zoology: Invertebrates. R. K. Rastogi Publications,
8. Kotpal, R. L. (2012). Modern Textbook of Zoology: Vertebrates. R. K. Rastogi Publications,
9. Lull, R. S. (1984). Organic Evolution. Seema Publication, New Delhi.
10. Manning, A. and Dawkins, M S. (2012). An Introduction to Animal Behaviour, 6th Edition. Cambridge University Press.
11. Pough, F. H., Janis, C. M. and Heiser, J. B. (2012). Vertebrate Life, 9th Edition, Pearson Benjamin Cummings.
12. Ruppert, E. E., Fox, R. S. and Barnes, R. D. (2006). Invertebrate Zoology: A Functional Evolutionary Approach, 7th Edition. Cengage Learning India.

13. Sinha, A. K., Adhikari, S. and Ganguly, B. B. (2010). Biology of Animals, Vols. I & II. New Central Book Agency. Kolkata.
14. Sinha, A. K., Adhikari, S. and Ganguly, B.B. (2010). Fundamentals of Biology. New Central Book Agency. Kolkata.
15. Young, J. Z. (2004). Life of Vertebrates, 3rd Edition, Oxford University Press.

Paper SB (Practical)

Functional Anatomy, Zoogeography and Adaptations

Marks: 25

Time: 4 Hours

A. Dissections:

1. Nervous system in prawn/earthworm.
2. Accessory respiratory organs in teleost fish.
3. Digestive system in albino rat/ albino mouse/chicken.
3. Reproductive system in albino rat/ albino mouse/chicken.

B. Mounting (Permanent):

1. Cyclops.
2. Setae of earthworm.
3. Spicules of sponge.
4. Scales (cycloid, ctenoid and placoid) of fishes.
5. Feathers of birds (filoplumes, down feathers, barbs and barbules).

C. Study of Permanent Slides and Specimens:

1. Histology: T/S of stomach, intestine, liver, kidney, spleen and gonads of fish/Aves/mammals.
2. Permanent slides of representatives from Protozoa to Echinodermata (sections and whole mounts).
3. Adaptive modifications of beak and feet in birds using charts and models.

Distribution of Marks:

1. Dissection
2. Mounting
3. Spotting
4. *Viva Voce*
5. Laboratory Record

Total

25 (Internal test – 7 + End semester test - 18)

Paper 6A**Cell and Molecular Biology, and Genetics (Theory)**

Marks: 75

Time: 3 Hours

- Unit-1:** Genome organization in virus, bacteria and eukaryotes. Central dogma of molecular biology; DNA replication in prokaryotes; Transcription and translation in prokaryotes; Genetic code. Regulation of gene expression in prokaryotes: *lac operon*.
- Unit -2:** Fine Structure of gene: Cistron, reeon and muton; Split genes and overlapping genes; Transposons. Gene mutation: Types and mutagenic agents; DNA damage and repair. Detection of mutation in *Drosophila* (Muller's *CIB* method).
- Unit-3:** Extra-nuclear inheritance: Kappa particles in *Paramecium*. Sex-linked inheritance in *Drosophila* (eye color) and man (colour blindness); Dosage compensation and Lyon's hypothesis. Non-disjunction of sex chromosomes in *Drosophila*; Human karyotype; Sex determination in man; Genetic disorders in man – Down's, Turner's and Klinefelter's syndromes, Phenylketonuria, Hemophilia.
- Unit-4:** Humoral and cell mediated immunity; Characteristics of antigens; Antibodies: Structure, classes and functions; Antigen-antibody interaction; Major histocompatibility complex; Introduction to cytokines.
- Unit-5:** Principles and applications of biological techniques: Light and electron microscopy; Centrifugation; Chromatography (paper, gel filtration and ion-exchange).

Suggested Readings:

- Albert, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J. D. (2007). Molecular Biology of the Cell, 5th Edition. Garland Publishing, London.
- Brown, T. A. (2006). Genomes 3. Garland Science.
- Cooper, G. M. and Hausman, R. E. (2009). The Cell: A Molecular Approach, 5th Edition. Sinauer Associates Inc. Publishers.
- Delves, P. J., Martin, S. J., Burton, D. R. and Roitt, I. M. (2011). Roitt's Essential Immunology, 12th Edition. Wiley-Blackwell.
- Gardener, E. J., Simmons, M. J. and Snustad, D. P. (2005). Principles of Genetics, 8th Edition. John Wiley and Sons.
- Hardin, J., Bertoni, G. P. and Kleinsmith, L. J. (2012). Becker's World of the Cell, 8th Edition. Benjamin Cummings.
- Karp, G. (2010). Cell Biology, 6th Edition. John Wiley & Sons, Inc.
- Khan, F. H. (2010). Immunology. Pearson Education India.
- Klug, W. S., Cummings, M. R., Spencer, C. A. and Palladino, M. A. (2012). Concepts of Genetics, 10th Edition. Benjamin Cummings.
- Krebs, J., Goldstein, E. and Kilpatrick, S. (2011). Lewin's Genes X. Jones & Bartlett Learning.
- Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M P. (2012). Molecular Cell Biology, 7th Edition. W.H. Freeman.
- Owen, J., Punt, J. and Stranford, S. (2012). Kuby Immunology, 7th Edition. W. H. Freeman & Company.
- Pathak, S. and Palan, U. (2012). Immunology, 11th Edition. Science Publishers.
- Pierce, B. (2012). Genetics: A Conceptual Approach, 4th Edition. W.H. Freeman
- Strickberger, M. W. (2006). Genetics, 3rd Edition. Macmillan Publishing Company.
- Watson, J. D., Baker, T. A., Bell, S. P., Gann, A., Levine, M. and Losick, R. (2008). Molecular Biology of the Gene, 6th Edition. Pearson, Benjamin Cummings.

17. Wilkins, K. and Walker, J (2012). Practical Biochemistry: Principles and Techniques. Cambridge University Press.

Paper 6B (Practical)

Cell and Molecular Biology, and Genetics

Marks: 25

Time: 4 hours

1. Separation and identification of amino acids by paper chromatography.
2. Demonstration of antigen-antibody interaction *in vitro*: Single radial immuno-diffusion in agarose gel.
3. Study of nucleic acids from models/charts.
4. Calorimetric estimation of DNA and RNA.
5. Preparation and identification of meiotic stages from grasshopper testis.
6. Karyotyping of normal human chromosomal complement from supplied photographic plates.
7. Karyotyping of chromosomal complement of Down's/Turner's/Klinefelter's syndrome from supplied photographic plates.
8. Demonstration of electrophoretic separation of DNA/protein.

Distribution of Marks

1. Cell biology & Genetics
2. Molecular Biology
3. Spotting
4. *Viva Voce*
5. Laboratory Record

Total

25 (Internal test - 7 + End semester test - 18)