ZOOLOGY SYLLABUS FOR III SEMESTER

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

HOURS: 60 (5X12) Max. Marks: 100

Unit – I Cell Biology

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma

1.2 Electron microscopic structure of animal cell.

1.3 Plasma membrane –Models and transport functions of plasma membrane.

1.4Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes

1.5 Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes (Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin, Structure and Functions with suitable diagrams) 2. Need not study cellular respiration under mitochondrial functions)

Unit – II Genetics – I

 2. 1 Mendel‟s work on transmission of traits

2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes

2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance

 2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)

2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics - II

3.1 Mutations & Mutagenesis

3.2 Chromosomal Disorders (Autosomal and Allosomal)

3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)

3.4 Basics on Genomics and Proteomics

UNIT IV: Molecular Biology

4.1 Central Dogma of Molecular Biology

4.2 Basic concepts of - a. DNA replication – Overview (Semi-conservative mechanism, Semidiscontinuous mode, Origin & Propagation of replication fork) b. Transcription in prokaryotes – Initiation, Elongation and Termination, Posttranscriptional modifications (basics) c. Translation – Initiation, Elongation and Termination

4.3 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

Unit - V

5.1 Origin of life

5.2 Theories of Evolution: Lamarckism, Darwinism, Germ PlasmTheroy, Mutation Theory

5.3Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

5.4Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

Co-curricular activities (Suggested)

 Model of animal cell

• Working model of mitochondria to encourage creativity among students

• Photo album of scientists of cell biology

• Charts on plasma membrane models/cell organelles

• Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanica

l• garden or local village as a student study project activity Observation of blood group inheritance in students, from their parents and grand parents

• Karyotyping and preparation of pedigree charts for identifying diseases in family history

• Charts on chromosomal disorders

• Charts on central dogma/lac operon/genetic code

• Model of semi-conservative model of DNA replication

• Model of tRNA and translation mechanism

• Power point presentation of transcription or any other topic by students

• Draw geological time scale and highlight important events along the time line

• Chart on industrial melanism to teach directed selection, Darwin‟s finches to teach

• genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

REFERENCES:

 1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell „Molecular Cell Biology‟ W.H.Freeman and company New York.

2. Cell Biology by De Robertis

3. Bruce Alberts, Molecular Biology of the Cell

4. Rastogi, Cytology

5. Varma & Aggarwal, Cell Biology

 6. C.B. Pawar, Cell Biology

7. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008).Principles of Genetics. VIII Edition. Wiley India.

8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.

9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.

 10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.

11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.

12. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing

13. Molecular Biology by freifielder

 14. Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited

15. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers

16. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.

17. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.

 18. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.

19. James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene‟

 20. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.

21. Gupta P.K., „Genetics

ZOOLOGY MODEL PAPER FOR III SEMESTER ZOOLOGY –

PAPER - III CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time : 3 hrs Max. Marks : 75

 I.Answer any FIVE of the following : 5x5=25

 Draw labeled diagrams wherever necessary

 1.

2.

3.

4.

5.

6.

7.

8.

 II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

9. OR

10. OR

11. OR

12. OR

 13. OR

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - PAPER - III CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Periods: 24 Max. Marks: 50

I. Cell Biology

 1. Preparation of temporary slides of Mitotic divisions with onion root tips

2. Observation of various stages of Mitosis and Meiosis with prepared slides

3. Mounting of salivary gland chromosomes of Chiranomous

 II. Genetics

1. Study of Mendelian inheritance using suitable examples and problems

2. Problems on blood group inheritance and sex linked inheritance

3. Study of human karyotypes (Down‟s syndrome, Edwards, syndrome, Patau syndrome, Turner‟s syndrome and Klinefelter syndrome)

 III. Evolution

1. Study of fossil evidences

 2. Study of homology and analogy from suitable specimens and pictures

 3. Phylogeny of horse with pictures

 4. Study of Genetic Drift by using examples of Darwin‟s finches (pictures)

5. Visit to Natural History Museum and submission of report

REFERENCE BOOKS

1. Burns GW. 1972. The Science of Genetics. An Introduction to Heredity. Mac Millan Publ. Co.Inc.

2. Gardner EF. 1975. Principles of Genetics. John Wiley & Sons, Inc. New York.

3. Harth and Jones EW. 1998. Genetics – Principles and Analysis. Jones and BarHett Publ. Boston.

4. Levine L. 1969. Biology of the Gene. Toppan.

 5. Pedder IJ. 1972. Genetics as a Basic Guide. W. Norton & Company, Inc.

 6. Rastogi VB. 1991. A Text Book of Genetics.KedarNath Ram Nath Publications, Meerut, Uttar Pradesh, India.

7. Rastogi VB. 1991. Organic Evolution.KedarNath Ram Nath Publications, Meerut,Uttar Pradesh, India. 8. Stahl FW. 1965. Mechanics of Inheritance. Prentice-Hall.

9. White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ.Press.