

8. ZOOLOGY (Optional)

Semester Scheme (CBSC - Pattern) (B.Sc V semester)

With Effect From 2019-20

Semesters	Syllabus	Total Hours	Theory & Practical/ Week
I	BIOLOGY OF NON-CHORDATES	50hrs.	4 hrs.
	PRACTICAL	12	4 hrs.

THEORY MARKS			PRACTICAL MARKS		
Internal	Annual	Total Marks	Internal	Annual	Total Marks
20	80	100 marks	10	40	50 marks

Question paper pattern for THEORY examination

Que.No.	Marks	Solve	Total Marks
I	02	10	20
II	04	05	20
III	10	04	40
TOTAL --- 80 MARKS			

PRACTICAL pattern for examination

Que.No.	Solve	Total Marks
I	Dissection (Explain any one system)	06
II	Mounting	05
III	Identification / Spotting (12)	24
IV	Journal	05
TOTAL --- 40 MARKS		

Syllabus with effect from 2019 – 20
B.Sc Fifth semester [Paper I]

Ecology, Evolution, Paleontology, Zoogeography, Wildlife conservation

ECOLOGY (27 Hours)

Introduction: Earth as living planet, sub divisions of ecology, scope of ecology, biosphere 1 Hr

Ecosystem: Component of the ecosystem (abiotic and biotic factors), Significance of biotic and abiotic components, food chain, food web Effect of Light and Temperature on animals and plants 5 Hrs

Animal interactions: Symbiosis (mutualism and commensalism), Parasitism, Predation, and Competition with examples 2 Hrs

Habitats: Freshwater habitat - Lotic and Lentic systems
Marine habitat - Zonation of Sea, Marine Biota, Estuarine ecology, Mangroves.
Terrestrial habitat: A brief account of Biomes
Adaptations: Ecological adaptations of freshwater, marine and terrestrial animals 6 Hrs

Biogeochemical cycles: Principles and concepts of water, nitrogen, carbon and oxygen cycles 4 Hrs

Community ecology: Community structure, ecological niches, edge effect, Stratification and ecotone 2 Hrs

Population ecology: Density, natality, mortality, age distribution, population growth, types and curves 2 Hrs

The geological time scale & fossils: Origin of Earth, Origin of life 5 Hrs
Theories with reference to origin of life. Definition and kinds of fossils, how fossils are formed, methods of preservation.
Connecting links and living fossils. The importance of fossils

EVOLUTION

Theories of Organic Evolution: Lamarckism, Darwinism, Mutation Theory and the Modern Synthesis theory (population gene pool, gene frequency. Variations, gene mutation, chromosomal mutation. Isolation and recombination. Genetic drift, Hardy Weinberg equilibrium
Evolution of Man and Horse and 5 Hrs

PALEONTOLOGY: Mesozoic reptiles

3 Hrs

ZOOGEOGRAPHY: Zoogeographical realms of world with emphasis on climatic conditions and biodiversity of the area. A brief account of Wallace's line

3 Hrs

WILDLIFE CONSERVATION: Wildlife conservation methods, Wildlife in India, Causes for the depletion of wildlife, Brief account of: IUCN, WWF, Bombay Natural History Society, Indian Board for Wild Life, Red Data Book. Wild Life Act 1972 and its amendments in India, CITES. Project Tiger and Biosphere Reserves.

12 Hrs

**Question paper pattern for theory examination
B.Sc Fifth Semester (Paper – I) Total 80 Marks**

Q. I	2 marks	12 questions to be given	Solve any 10	20 marks
Q.II	5 marks	6 questions to be given	Solve any 5	30 marks
Q.III	10 marks	2 questions to be given	Solve any 1	10 marks
Q.IV	10 marks	2 questions to be given	Solve any 1	10 marks
Q. V	10 marks	2 questions to be given	Solve any 1	10 marks

List of reference books

	Title of the Book	Author (s)	Publisher(s)
1	Ecology	Mohan P Arora	Himalaya Publishing House, Mumbai
2	Ecology	Eugene P Odum	Oxford and IBH Publishing Co. New Delhi
3	Concepts of Ecology	R L Kotpal and N P Bali	Vishal Publishing Co. Jalandhar City
4	Concepts of Ecology	N Arumugam	Saras Publications, Nagercoil, Tamilnadu
5	Ecology and environment	P D Sharma	Rastogi publications, Meerut
6	Fundamentals of Environmental Biology	S Arora	Kalyani Publishers, New Delhi
7	Essentials of Ecology and Environmental Science	S V S Rana	PHI Learning Private Ltd. Delhi
8	Elements of Animal Ecology and Zoogeography	R Nagabhushanam	Emkay Publications, Delhi
9	Basics of Ecology	Nirmal Chandra Pradhan	Anmol Publications Pvt. Ltd, New Delhi
10	Fundamentals of Ecology	M C Dash	Tata Mc Graw Hill New Delhi
11	Concepts of Ecology	Edward J Kormonty	Pearson - Prentice Hall - Dorling, Kindorsley (India) Pvt. Ltd,Licencees in South Asia
12	Evolution: Process and Product	Edwrad O Dodson	Reiuhold Publishing Corporation, New York
13	Evolution	Ruth Moore	Time Incorporated, New York
14	The origin of species by means of natural selection	Charles Darwin	Surjeet Publications, Delhi
15	Principles of organic evolution	T S Gopalkrishnari, Itta Sambasivaiah and A P Kamalakar Rao	Himalaya Publishing House, Mumbai
16	Introduction to Evolution	Paul Amos Moody	Kalyani Publishers, New Delhi
17	Environmental Economics: A text book	M Karpagam	Sterling Publishers Pvt. Ltd, New Delhi
18	A text book of Environmental Chemistry	A K de	Wiley Eastern Limited New Delhi
19	Wildlife wealth in India (Resources and Management)	Majupuria Trilok Chandra	Teepress Service, L.P Bangkok, Thailand

Practical Syllabus B.Sc Fifth Semester (Practical I) Total Practicals – 13 & One visit

1.	Study of fossils (vertebrates (3) and invertebrates (3)	1 Practical
2.	Mesozoic reptiles (Ichthyosaur, tyrannosaur, brontosaur, Archaeopteryx)	1 Practical
3.	Evolution of man (Homo-erectus , Homo-habilis, Homo-neandertalences)	1 Practical
4.	Evolution of Horse	1 Practical
5.	Connecting links and living fossils (Neopilina, Peripatus, Limulus, Latimaria, Archaeopteryx and Duckbill platypus)	1 Practical
6.	Study of threatened animals of India (Tiger, Lion, Single horned Rhinoceros, Musk deer, Gaur, Golden Langur, Lion tailed monkey)	2 Practicals
7.	Estimation of CO ₂ from different water samples	1 Practical
8.	Estimation of dissolved oxygen from different water samples	1 Practical
9.	Estimation of total hardness	1 Practical
10.	Study of Ecological Adaptations and Morphological peculiarities: Examples” Hermit crab, Draco, Stick insect, Puffer fish, Exocetus, Phrynosoma, Chameleon and Bat.	1 Practical
12	Marking of existing Project tiger areas and Biosphere reserves in Indian map	1 Practical
13	Spotting of the endangered animals conserved in protected areas of Karnataka state (using Karnataka map)	1 Practical
14.	Visit to nearby water body to study ecosystem	

Question paper pattern for practical examination

I	Marking of endangered animal or project tiger or biosphere reserves in the given map	6 marks
II	Evolution (Two spottings)	4 marks
III	Fossils (Two spottings)	4 marks
IV	Identification (Zoogeography & Wildlife)	6 marks
V	Estimation of CO ₂ or Dissolved oxygen or Total hardness	6 marks
VI	Project on Local Biodiversity	5 marks
VI	Viva	4 marks
VII	Journal	5 marks
Total		40 marks

GENETICS (26 Hours)

Introduction: Mendel and his contributions. Monohybrid, Dihybrid cross (Laws).

Definition of genetics terminologies

Interaction of Genes: Supplementary Factors, Comb pattern in fowls.

Dominant Epistasis: Plumage colour in Leghorn and Wyandote

Recessive Epistasis: Coat colour in sweet peas.

Complimentary Factors – Flower colour in sweet peas.

Lethal gene – Coat colour in mice

9 Hrs

Multiple alleles: ABO blood group and Rh factor in human

2 Hrs

Linkage and Crossing over

Linkage in Drosophila, Significance of Crossing over

2 Hrs

Sex Determination: Chromosomal mechanism of sex determination,

Genic balance theory, Gynandromorphs and intersexes.

Syndromes in man: Klinefelter and Turners

Environmental and hormonal effects on determination of sex

3 Hrs

Sex Linked Inheritance

Sex Linked Inheritance in Drosophila and Man (Hemophilia and colour blindness in Man),

Sex linkage in poultry, Y - linked genes in man

3 Hrs

Mutations: Chromosomal aberrations,

Molecular basis of gene mutation and types

2 Hrs

Human Genetics : Human Genetic disorders - inborn errors of metabolism, Albinism, Phenyl ketonuria, Alkaptonuria, Sickle cell anaemia, Thalassemia, Huntington's Chorea

2 Hrs

Genetic Code and Protein Biosynthesis:

Properties of genetic code and Mechanism of biosynthesis. Wobble hypothesis

3 Hrs

BIOTECHNOLOGY (14 Hours)

Introduction, Sub-fields of biotechnology, history of biotechnology,
Biotechnology Scenario in India 2 Hrs

Branches of Biotechnology: Animal Biotechnology, Plant Biotechnology, Microbial
Biotechnology, Environmental Biotechnology, Medical Biotechnology 4 Hrs

Molecular biotechnology: Genetic engineering, isolation of DNA, Gene cloning,
Vectors, Restriction enzymes - Polymerase Chain Reaction (PCR),
DNA finger printing 4 Hrs

Applications of Biotechnology: Industrial application: Ethanol production,
Food processing, Food fermentors and Industrial enzymes.
Environmental Applications: Cleaning up of environmental pollutants, Bioremediation. 4 Hrs

BIOSTATISTICS (10 Hours)

Fundamentals of Biostatistics, Preliminary Concepts. Frequency distribution.
Graphical presentation of Data.
Measures of Central Tendency- Mean, Median and Mode. Measures of variation.
Probability. Chi-Square Test

Question paper pattern for theory examination B.Sc Fifth Semester (Paper – II)

Q. I	2 marks	12 questions to be given	Solve any 10	20 marks
	5 marks	6 questions to be given	Solve any 5	30 marks
	10 marks	2 questions to be given	Solve any 1	10 marks
	10 marks	2 questions to be given	Solve any 1	10 marks
	10 marks	2 questions to be given	Solve any 1	10 marks

REFERENCE BOOKS for BSc Fifth Semester (P-II) - Zoology

	Title of the Book	Author (s)	Publisher(s)
1	Principles of Genetics	Gardner Eldon John, Michael J Simmons and Peter Snustad	John Wiley & Sons, Inc. New York
2	Genetics	Kavita B Ahluwalia	WileyEastern Ltd, New Age International Ltd, New Delhi
3	A text book of Genetics	H S Bhamrah and C M Chaturvedi	Anmol Publications Pvt. Ltd. New Delhi
4	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	Dr P S Verma and Dr V K Agarwal	S Chand & Company Pvt. Ltd. New Delhi
5	Genetics: A survey of the principles of Heredity	A M Winchester	Oxford and IBH, New Delhi
6	Principles of Molecular Genetics	S Sundara Rajan	Anmol Publications Pvt. Ltd. New Delhi
7	Genetics	P S Verma and V K Agarwal	S Chand & Company Pvt. Ltd. New Delhi
8	Principles of Genetics	Edmund W Sinnott, L C Dunn and T Dobzhansky	Tata McGraw Hill Publishing Company, New Delhi
9	Genetics	Monroe W Strickberger	Prentice Hall of India Pvt. Ltd, New Delhi
10	Cytology, Genetics and Evolution	P K Gupta	Rastogi Publications, Meerut
11	Genetics and Biostatistics	Dr R P Meyyan	Saras Publications, Nagercoil, Tamilnadu
12	An introduction to Biostatistics	N Gurumani	M JP Publishers, Chennai
13	Fundamentals of Biostatistics	Satguru Prasad	Emkay Publications, New Delhi
14	A text book of Biotechnology	Dr R C Dubey	S Chand & Company Pvt. Ltd. New Delhi
15	Elements of Biotechnology	P K Gupta	Rastogi Publications, Meerut

B.Sc Fifth Semester (Practical II) Total Practicals – 11

1.	Study of human karyotype and disorders	3 Practicals
2.	Problems based on monohybrid, dihybrid, sex linked inheritance, Multiple alleles	1 Practical
3.	Calculation of gene frequency	1 Practical
4.	Study of blood groups	1 Practical
5.	Study of Paper Chromatography	1 Practical
6.	To form frequency distribution table & draw histogram, frequency polygon & frequency curve	1 Practical
7.	Measurement of central tendency (range, mean, mode and median)	1 Practical
8.	Isolation of DNA / RNA	1 Practical
9.	Preparation of Giant Chromosome/Drosophila Salivary gland Chromosomes	1 Practical

Question paper pattern for practical examination

I	Genetics (Three Genetics Problems & One Karyotype analysis (09+05)	14
II	Biotechnology or Isolation of DNA / RNA or Blood groups	05
III	Biostatistics	6
IV	Preparation of Giant / Salivary gland chromosomes	5
IV	Viva	5
V	Journal	5
Total		40