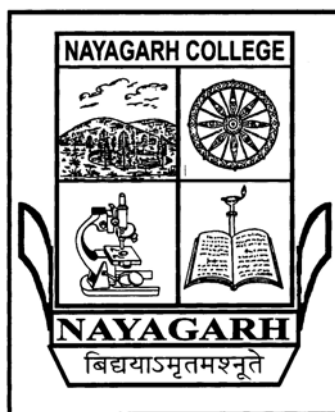


DEPARTMENT OF ZOOLOGY

Courses of Studies



CHOICE BASED CREDIT SYSTEM

B.Sc. ZOOLOGY (Honours & Elective)

2016-17

NAYAGARH AUTONOMOUS COLLEGE

NAYAGARH-752069

**Scheme of UG Course in Zoology
Under Choice Based Credit System (CBCS)**

A: Courses for Honours Students

Semester	Course	Course Code	Paper Title	Marks			Credit	
				Mid Sem	End Sem	Total		
Sem-I	Core	CC-1	Diversity & Evolution of Nonchordata (Protista to Pseudocoelomata)	20	50	100	4	6
		CC-1 Practical	Nonchordata (Protista to Pseudocoelomata)		30		2	
		CC-2	Perspectives in Ecology & Biostatistics	20	50	100	4	6
		CC-2 Practical	Perspectives in Ecology & Biostatistics		30		2	
	Generic Elective	GE –A.1	Chem-I	20	50	100	4	6
		GE-A.1 Practical	Chem-I		30		2	
	AECC	AECC-1	Environmental Science	20	80	100	4	4
						400		22
Sem-II	Core	CC-3	Diversity & Evolution of Nonchordata (Coelomata Nonchordata)	20	50	100	4	6
		CC-3 Practical	Diversity & Evolution of Nonchordata (Coelomata Nonchordata)		30		2	
		CC-4	Physiology: Life Sustaining System	20	50	100	4	6
		CC-4 Practical	Physiology: Life Sustaining System		30		2	
	Generic Elective	GE-B.1	Botany-I	20	50	100	4	6
		GE-B.1 Practical	Botany-I		30		2	
	AECC	AECC-2	MIL Communication(Odia/AE)	20	80	100	4	4
						400		22
Sem-III	Core	CC-5	Diversity & Distribution of Chordata	20	50	100	4	6
		CC-5 Practical	Diversity & Distribution of Chordata		30		2	
		CC-6	Physiology:Controlling & coordinating System	20	50	100	4	6
		CC-6 Practical	Physiology:Controlling & coordinating System		30		2	
		CC-7	Comparative Anatomy of Vertebrates	20	50	100	4	6
		CC-7 Practical	Comparative Anatomy of Vertebrates		30		2	
	Generic Elective	GE-A.2	Chem-II	20	50	100	4	6
		GE-A.2 Practical	Chem-II		30		2	
SEC	SEC-I	Communicative English	20	80	100	4	4	
						500		28
Sem-IV	Core	CC-8	Biochemistry of Metabolic Process	20	50	100	4	6
		CC-8 Practical	Biochemistry of Metabolic Process		30		2	

		CC-9	Cell Biology	20	50	100	4	6
		CC-9 Practical	Cell Biology		30		2	
		CC-10	Principles of Genetics	20	50	100	4	6
		CC-10 Practical	Principles of Genetics		30		2	
	Generic Elective	GE-B.2	Botany-II	20	50	100	4	6
		GE-B.2 Practical	Botany-II		30		2	
SEC	SEC-II		20	80	100	4	4	
						500		28
Sem-V	Core	CC-11	Developmental Biology	20	50	100	4	6
		CC-11 Practical	Developmental Biology		30		2	
		CC-12	Molecular Biology	20	50	100	4	6
		CC-12 Practical	Molecular Biology		30		2	
	DSE	DSE-1	Animal Behaviour	20	50	100	4	6
		DSE-1 Practical	Animal Behaviour		30		2	
		DSE-2	Economic Zoology	20	50	100	4	6
DSE-2 Practical	Economic Zoology		30	2				
						400		24
Sem- VI	Core	CC-13	Immunology	20	50	100	4	6
		CC-13 Practical	Immunology		30		2	
		CC-14	Evolutionary Biology	20	50	100	4	6
		CC-14 Practical	Evolutionary Biology		30		2	
	DSE	DSE-3	Microbiology	20	50	100	4	6
		DSE-3 Practical	Microbiology		30		2	
	DSE-4	Project		100	100	6	6	
						400		24
Total of All Semesters						2600		148

ZOOLOGY (HONOURS)

SEMESTER-I

PAPER: CC-1

DIVERSITY AND EVOLUTION OF NON-CHORDATA (PROTISTA TO PSEUDOCOELOMATES)

(Credits: 6, Theory-4, Practical-2)

Lectures: 60 (Theory: 40, Practical: 20)

Max. Marks: 100 (Theory: 70, Practical: 30)

UNIT-I: Kingdom Protista

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Plasmodium vivax. Trypanosoma gambiense and Entamoeba histolytica; Locomotion and reproduction in Protista.

UNIT-II: Phylum Porifera and Ctenophora

General characteristics and classification up to classes; Canal system in sponges; General characteristics and evolutionary significance of Ctenophora, Evolution of Parazoa and Metazoa.

UNIT-III: Phylum Cnidaria

General characteristics and classification up to classes; Metagenesis in Obelia; Polymorphism in Cnidaria; Corals and coral reefs.

UNIT-IV: Phylum Platyhelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Fasciola hepatica and Taenia solium; Parasitic adaptations.

UNIT-V: Phylum Nematelminthes

General characteristics and classification up to classes; Life cycle, pathogenicity and prophylaxis of Ascaris lumbricoides and Wuchereria Bancrofti; Parasitic adaptations.

Note: Classification to be followed from " Barnes RD (1982) Invertebrate Zoology; 5th Edition."

PRACTICAL-1

Kingdom Protista

1. Morphology of Paramecium, Binary fission and Conjugation in Paramecium.
2. Life stages of Plasmodium vivax, Trypanosma gambiense and Entamoeba histolytica (Slides/ Micro-photographs).
3. Examination of pond water for protists.

Phylum Porifera

4. Study of Sycon (including T.S. and L.S.), Hyalonema, and Euplectella.
5. Temporary mounts of spicules, gemmules and sponging fibres. Phylum Cnidaria
6. Study of Obelia, Physalia, Millepora, Aurelia, Ephyra larva, Tubipora, Corallium, Alcyonium, Gorgonia and Metridium (including T.S. and L.S.).

Phylum Ctenophora

7. Any one specimen/slide.

Phylum Platyhelminthes

8. Study of adult Fasciola hepatica, Taenia solium and their life stages (Slides/microphotographs). Phylum Nematelminthes
9. Study of adult Ascaris lumbricoides, Wuchereria bancrofti and their life stages (Slides/microphotographs).

Note: Classification to be followed from " Barnes RD (1982) Invertebrate Zoology; 5th Edition."

Recommended Books:

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

ZOOLOGY (HONOURS)

SEMESTER-I

PAPER: CC-2

C:2-PERSPECTIVES IN ECOLOGY AND BIostatISTICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction to Ecology and Ecosystem

Relevance of studying ecology; History of ecology; Laws of limiting factors; Detailed study of temperature and light as physical factors; Types of ecosystem; Food chain, Detritus and grazing food chains; Food web; Energy flow through the ecosystem; Ecological pyramids.

UNIT-II: Population

Unitary and modular populations; Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion; Exponential and logistic growth, equation and patterns, r and K strategies, Population regulation density-dependent and independent factors; Population interactions, Gause's Principle with laboratory and field examples; Lotka-Volterra equation for competition and Predation, functional and numerical responses.

UNIT-III: Community

Community characteristics: dominance, diversity, species richness, abundance, stratification; Ecotone and edge effect; Ecosystem development (succession) with example and Theories pertaining to climax community; Nutrient and biogeochemical cycle, Nitrogen cycle and Sulphur cycle.

UNIT-IV: Conservation of Biodiversity

Types of biodiversity, its significance, loss of biodiversity; Conservation strategies (in situ and ex situ); Endangered species concept; Role of ZSI, WWF, IUCN; Wildlife (Protection) Act, 1972.

UNIT-V: Biostatistics

Concept, definition and scope of biostatistics, biological data, sampling techniques, measures of central tendency (mean, median and mode), measures of dispersion, hypothesis and testing of hypothesis (chi square test, t test and Z test), correlation and regression analysis; Data analysis using EXCEL programme.

PRACTICAL-2

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: fauna and flora Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winklers method), Chemical Oxygen Demand and free CO₂.
4. Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary.
5. Determination of mean, median, mode and standard deviation of biological data.

Recommended Books

1. Colinaux PA (1993) Ecology. II Edition. John Wiley and Sons, Inc., USA.
2. Dash MC (1993) Fundamentals of Ecology. McGraw Hill Book Company, New Delhi.
3. Joshi N and Joshi PC (2012) Ecology and Environment. 1st Edition. Himalaya Publishing House, New Delhi.
4. Odum EP (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
5. Ricklefs, R.E., (2000). Ecology. 5th Edition. Chiron Press.
6. Robert Leo Smith Ecology and field biology Harper and Row.
7. Singh JS, Gupta SR and Singh SP (2014) Ecology, Environmental Science and Conservation. S. Chand, New Delhi.
8. Chainy, GBN, Mishra G and Mohanty PK. Basic Biostatistics, Kalyani Publisher.

ZOOLOGY (HONOURS)

SEMESTER-2

PAPER: CC-3

C:3-DIVERSITY AND EVOLUTION OF NON-CHORDATA

(COELOMATE NONCHORDATES)

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Phylum Annelida

General characteristics and classification up to classes; Evolution of Coelom; Metamerism and Excretion in Annelida.

UNIT-II: Phylum Arthropoda

General characteristics and classification up to classes; Vision in Arthropoda; Respiration in Arthropoda; Moulting in insects, Metamorphosis in insects; Social life in insects (bees and termites) and Larval forms in Crustacea.

UNIT-III: Phylum Onychophora

General characteristics and evolutionary significance and affinities of Peripatus.

UNIT-IV: Phylum Mollusca

General characteristics and classification up to classes; Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves and Evolutionary significance of trochophore larva.

UNIT-V: Phylum Echinodermata

General characteristics and classification up to classes; Water-vascular system in Asteroidea; Larval forms in Echinodermata and Evolutionary significance (Affinities with Chordates).

Note: Classification to be followed from " Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition."

PRACTICAL - 3

Phylum Annelida

1. Study of Aphrodite, Nereis, Sabella, Terebella, Serpula, Chaetopterus, Pheretima and Hirudinaria.
2. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
3. T.S. through crop of leech.

Phylum Arthropoda

4. Study of Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, termite, louse, honeybee, silk moth, wasp and dragon fly.

Phylum Onychophora.

5. Any one specimen/slide.

Phylum Mollusca

6. Study of Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Mytilus, Loligo, Sepia, Octopus and Nautilus and Cypraea (cowrie).

Phylum Echinodermata

7. Study of echinoderm larvae.
8. Study of Pentaceros, Asterias, Ophiura, Clypeaster, Echinus, Echinocardium, cucumaria and Antedon.

Note: Classification to be followed from " Barnes, R.D. (1982). Invertebrate Zoology, 5th Edition, Holt Saunders International Edition."

Recommended books

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

ZOOLOGY (HONOURS)

SEMESTER-2

PAPER: CC-4

C:4-PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Digestive System

Structural organization, histology and functions of gastrointestinal tract and its associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Role of gastrointestinal hormones on the secretion and control of enzymes of gastrointestinal tract.

UNIT-II: Respiratory System

Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volume and capacity; Transport of oxygen in the blood; Oxygen- hemoglobin and myoglobin, dissociation curve and the factors influencing it; Carbon monoxide poisoning; Carbon dioxide transport in the blood; buffering action of blood and haemoglobin and Control of respiration.

UNIT-III: Excretory System

Structure of kidney and its histological details;Renal blood supply; Mechanism of urine formation and its regulation and Regulation of acid-base balance.

UNIT-IV: Blood

Components of blood and their functions; Structure and functions of haemoglobin; Haemopoiesis; Haemostasis, Coagulation of blood and Disorders of blood.

UNIT-V: Heart

Structure of heart; Coronary circulation; Structure of conducting and working of myocardial fibers; Origin and conduction of cardiac impulses functions of AV node; Cardiac cycle; Cardiac output and its regulation-Frank-Starling Law of the heart; Nervous and chemical regulation of heart rate; Blood pressure and its regulation and Electrocardiogram.

PRACTICAL-4

1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli's haemoglobinometer.
3. Preparation of haemin and haemochromogen crystals.
4. Recording of blood pressure using a Sphygmomanometer.
5. Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung and kidney.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.
2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiores Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. & Wilkins, USA.

ZOOLOGY (HONOURS)

SEMESTER-2

PAPER: CC-5

C:5-DIVERSITY AND DISTRIBUTION OF CHORDATA

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Protochordata and Origin of Chordates

General characters of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata; Dipleurula concept and the Echinoderm theory of origin of chordates.

UNIT-II: Introduction to Vertebrata and Agnatha

Advanced features of vertebrates over Protochordata; General characters and classification of cyclostomes up to class; Structural peculiarities and affinities of Petromyzon and Myxine.

UNIT-III: Pisces and Amphibia

General characters of Chondrichthyes and Osteichthyes and classification up to order; Migration; Osmoregulation and Parental care in fishes; Scales in fishes; Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characters and classification up to order and Parental care in Amphibians.

UNIT-IV: Reptilia and Aves

General characters and classification up to order; Skull in Reptilia; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes; General characters and classification up to order; Principles and aerodynamics of flight, Flight adaptations; Archaeopteryx- a connecting link and Migration in birds.

UNIT-V: Mammals and Zoogeography

General characters and classification up to order; Affinities of Prototheria and Metatheria; Dentition in mammals; Adaptive radiation with reference to locomotory appendages; Zoogeographical realms; Theories pertaining to distribution of animals and Distribution of vertebrates in different realms.

PRACTICAL

Protochordata

1. Balanoglossus, Herdmania, Branchiostoma and Colonial Urochordata.
2. Sections of Balanoglossus through proboscis and branchiogenital regions.
3. Sections of Amphioxus through pharyngeal, intestinal and caudal regions.
4. Permanent slide of spicules of Herdmania.

Agnatha

5. Petromyzon and Myxine.

Fishes

6. Sphyrna, Pristis, Trygon, Torpedo, Chimaera, Notopterus, Mystus, Heteropneustes, Hippocampus, Exocoetus, Echeneis, Anguilla, Tetradon, Diodon, Anabas and Flat fish.

Amphibia

7. Ichthyophis/Ureotyphlus, Necturus, Duttaphrynus, Polypedates, Hyla, Alytes and Salamandra.

Reptiles

8. Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Draco, Ophiosaurus, Bungarus, Vipera, Naja, Hydrophis, Zamenis and Crocodylus.
9. Key for Identification of poisonous and non-poisonous snakes.

Aves.

10. Study of six common birds from different orders.
11. Types of beaks and claws.
12. Types of feathers.

Mammalia

13. Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes and Hemiechenis.

Recommended Books

1. Agarwal VK (2011) Zoology for degree students. S. Chand, New Delhi.
2. Arora MP (2006) Chordata-1. 1st Edition. Himalaya Publishing House, New Delhi.
3. Hall BK and Hallgrimsson B (2008) Strickberger's Evolution. 4th Edition. Jones and Bartlett Publishers Inc., USA.
4. Jordan EL and Verma PS (1963) Chordate Zoology. Revised Edition. S. Chand, New Delhi.
5. Young JZ (2004) The Life of Vertebrates. 3rd Edition. Oxford University Press, USA.

ZOOLOGY (HONOURS)

SEMESTER-3

PAPER: CC-6

C:6-PHYSIOLOGY CONTROLLING AND COORDINATING SYSTEM

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Tissues and Glands,

Bone and cartilage Structure, location, function and classification of Epithelial tissue, Connective tissue, Muscular tissue, Nervous tissue; Types of glands and their functions; Structure and types of bones and cartilages; Ossification, bone growth and resorption.

UNIT-II: Nervous System

Structure of neuron, resting membrane potential; Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; types of synapsis, Synaptic transmission; Neuromuscular junction; Reflex action and its types, Reflex arc and Physiology of hearing and vision.

UNIT-III: Muscle Histology of different types of muscle;

Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor Unit, summation and tetanus.

UNIT-IV: Reproductive System

Histology of male and female reproductive systems; Puberty; Physiology of reproduction of male and female; Methods of contraception (depicted through flow chart).

UNIT-V: Endocrine System

Functional Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, thymus, pancreas, adrenals; Hormones secreted by them and their mechanism of action; Gonadal hormones; Classification of hormones; Regulation of their secretion; Mode of hormone action; Signal transduction pathways utilized by steroidal and non-steroidal hormones; Hypothalamus (neuroendocrine gland), principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system and Placental hormones.

PRACTICAL--5

1. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex).
2. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells.
3. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid.

Recommended Books

1. Arey LB (1974) Human Histology. 4th Edition. W.B. Saunders, USA.
2. Chatterjee CC (2008) Human Physiology. Vol. I and II. Medical Allied Agency, Kolkata.
3. Guyton AC and Hall JE (2006) Textbook of Medical Physiology. 9th Edition. W.B. Saunders Company, Philadelphia.
4. Tortora GJ and Derrickson B (2012) Principles of Anatomy & Physiology. 13th Edition John Wiley and sons, USA.
5. Victor PE (2008) diFiores Atlas of Histology with Functional Correlations. 12th Edition, Lippincott W. and Wilkins, USA.

ZOOLOGY (HONOURS)

SEMESTER-3

PAPER: CC-7

C:7-COMPARATIVE ANATOMY OF VERTEBRATES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Integumentary System and Skeletal System

Structure, functions and derivatives of integument; Axial and appendicular skeletons; Jaw suspensorium in vertebrates.

UNIT-II: Digestive and Respiratory System

Alimentary canal and associated glands; Skin, gills, lungs and air sacs and Accessory respiratory organs in fishes.

UNIT-III: Circulatory System

General plan of circulation; Evolution of heart and aortic arches.

UNIT-IV: Urinogenital System

Succession of kidney; Evolution of urinogenital ducts and Types of mammalian uteri.

UNIT-V: Nervous System and Sense Organs

Comparative account of brain; Autonomic nervous system; Spinal Nerves; Spinal cord; Cranial nerves in Mammals; Classification of receptors; visual receptors, chemoreceptors and mechanoreceptors.

PRACTICAL-7

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.
2. Disarticulated skeleton of Frog, Varanus, Fowl and Rabbit.
3. Carapace and plastron of turtle or tortoise.
4. Mammalian skulls (One herbivorous and one carnivorous animal).

Recommended Books

1. Hilderbrand M and Gaslow GE. Analysis of Vertebrate Structure. John Wiley and Sons., USA.
2. Kardong KV (2005) Vertebrates Comparative Anatomy, Function and Evolution. 4th Edition. McGraw-Hill Higher Education, New York.
3. Kent GC and Carr RK (2000) Comparative Anatomy of the Vertebrates. 9th Edition. The McGraw-Hill Companies, New York.
4. Weichert CK and William Presch (1970) Elements of Chordate Anatomy. Tata McGraw Hill, New York.

ZOOLOGY (HONOURS)

SEMESTER-3

PAPER: CC-8

C:8-BIOCHEMISTRY OF METABOLIC PROCESSES

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Biomolecules

Structures and properties of important mono-, di- and polysaccharides; Fatty acids, triglycerides and steroids; and amino acids and proteins.

UNIT-II: Carbohydrate Metabolism

Glycolysis; Citric acid cycle; pentose phosphate pathway; Gluconeogenesis; Shuttle systems (Malate-aspartate shuttle, Glycerol 3-phosphate shuttle); Glycogenolysis; Glycogenesis.

UNIT-III: Lipid Metabolism

β -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid and Ketogenesis and its regulation.

UNIT-IV: Protein Metabolism

Catabolism of amino acids: Transamination, Deamination; Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

UNIT-V: Enzymes and Oxidative Phosphorylation

Kinetics and Mechanism of action of enzymes; Inhibition of enzyme action; Allosteric enzymes; Oxidative phosphorylation in mitochondria; Respiratory chain, ATP synthase, inhibitors and Uncouplers.

PRACTICAL-8

1. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
2. Colour tests of functional groups in protein solutions.
3. Action of salivary amylase under optimum conditions.
4. Effect of pH on the action of salivary amylase.
5. Effect of temperature on the action of salivary amylase.
6. Estimation of total protein in given solutions by Lowry's method.

Recommended Books

1. Berg JM, Tymoczko JL and Stryer L (2007) Biochemistry. 6th Edition, W.H. Freeman and Co., New York.
2. Cox MM and Nelson DL (2008) Lehninger Principles of Biochemistry. 5th Edition. W.H. Freeman and Co., New York.
3. Devesena T (2014) Enzymology. 2nd Edition. Oxford University Press, UK.
4. Hames BD and Hooper NM (2000) Instant Notes in Biochemistry. 2nd Edition. BIOS Scientific Publishers Ltd., U.K.
5. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Well PA (2009) Harpers Illustrated Biochemistry. New York. 28th Edition. International Edition. The McGraw-Hill Companies Inc.,

ZOOLOGY (HONOURS)

SEMESTER-4

PAPER: CC-9

C:9-CELL BIOLOGY

(Credits:6, Theory-4, Practicals-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Cells and Plasma Membrane

Prokaryotic and Eukaryotic cells; Mycoplasma; Virus, Viroids, Virions and Prions; Various models of plasma membrane; Transport across membranes; Cell junctions: Occluding junctions (Tight junctions), Anchoring junctions (desmosomes), Communicating junctions (gap junctions) and Plasmodesmata.

UNIT-II: Endomembrane System, Mitochondria and Peroxisomes

The Endoplasmic Reticulum; Golgi apparatus; Mechanism of vesicular transport; Lysosomes; Structure and function of mitochondria: Chemi-osmotic hypothesis; Semiautonomous nature of mitochondria; Endosymbiotic hypothesis and Peroxisomes.

UNIT-III: Cytoskeleton and Nucleus

Structure and functions of intermediate filament, microtubules and microfilaments; Ultra structure of nucleus; Nuclear envelope: Structure of nuclear pore complex; Chromosomal DNA and its packaging; Structure and function of Nucleolus.

UNIT-IV: Cell Cycle and Cell Signaling

Cell cycle, Regulation of cell cycle; Signaling molecules and their receptors.

UNIT-V: Apoptosis and Cancer

Extrinsic (Death Receptor) Pathway and Intrinsic (Mitochondrial) Pathway; Growth and development of tumors and Metastasis.

PRACTICAL-9

1. Gram's staining technique for visualization of prokaryotic cells.
2. Study various stages of mitosis from permanent slides.
3. Study various stages of meiosis from permanent slides.
4. Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides).
5. Cytochemical demonstration (Preparation of permanent slides).
 - (i) DNA by Feulgen reaction.
 - (ii) Mucopolysaccharides by PAS reaction.
 - (iii) Proteins by Mercurobromophenol blue.
 - (iv) DNA and RNA by Methyl Green Pyronin.

(In practical examination, 05 marks should be of permanent slide submission; one mark each for DNA, PAS, Proteins, MGP and Barr body slide.)

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni G P (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell. 5th Edition. Garland publishing Inc., New York.
3. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press, Washington D.C.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition. Lippincott Williams and Wilkins, Philadelphia.
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc., USA.

ZOOLOGY (HONOURS)

SEMESTER-4

PAPER: CC-10

C:10-PRINCIPLES OF GENETICS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Mendelian Genetics and its Extension

Principles of inheritance; Incomplete dominance and co-dominance; Multiple alleles, Lethal alleles; Epistasis; Pleiotropy; Sex-linked inheritance.

UNIT-II: Linkage, Crossing Over and Chromosomal Mapping

Linkage and crossing over; Cytological basis of crossing over; Molecular mechanisms of crossing over; Recombination frequency as a measure of linkage intensity; Two factor and three factor crosses; Interference and coincidence and Somatic cell hybridization.

UNIT-III: Mutations

Gene mutations; Chromosomal mutations: Deletion, duplication, inversion, translocation; Aneuploidy and polyploidy; Induced versus spontaneous mutations; Backward and forward mutations; Suppressor mutations; Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB methods, attached X method and DNA repair mechanisms.

UNIT-IV: Sex Determination and Quantitative Genetics

Chromosomal mechanisms of sex determination; Sex-linked, sex-influenced and sex limited characters; Polygenic inheritance and Transgressive variation.

UNIT-V: Extra-chromosomal Inheritance

Criteria for extra-chromosomal inheritance; Antibiotic resistance in Chlamydomonas; Mitochondrial mutations and Maternal effects.

PRACTICAL-10

1. To study the Mendelian laws and gene interactions and their verification by Chi square analyses using seeds/beads/Drosophila.
2. Identification of various mutants of Drosophila.
3. To calculate allelic frequencies by Hardy-Weinberg Law.
4. Linkage maps based on data from crosses of Drosophila.
5. Study of human karyotype (normal and abnormal).
6. Pedigree analysis of some human inherited traits.
7. Preparation of polytene chromosomes from larva of Chironomous/Drosophila.
8. To study mutagenicity in Salmonella/E. coli by Ames test.

Recommended Books

1. Gardner EJ, Simmons MJ, Snustad DP (2008) Principles of Genetics. 8th Edition. Wiley India.
2. Griffiths AJF, Wessler SR, Lewontin RC and Carroll SB. Introduction to Genetic Analysis. 9th Edition. W. H. Freeman and Co., NewYork.
3. Klug WS, Cummings MR, Spencer CA and Palladino MA (2012) Concepts of Genetics. 10th Edition. Pearson Education, Inc., USA.
4. Russell PJ (2009) Genetics- A Molecular Approach. 3rd Edition. Benjamin Cummings, USA.
5. Snustad DP and Simmons MJ (2012) Principles of Genetics. 6th Edition. John Wiley and Sons Inc., USA.
6. Verma PS and AgarwalVK (2010) Genetics. 9th Edition. S. Chand, New Delhi.

ZOOLOGY (HONOURS)

SEMESTER-5

PAPER: CC-11

C:11-DEVELOPMENTAL BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction

History and basic concepts: Epigenesis, preformation, Mosaic and regulative development; Discovery of induction; Cell-Cell interaction; Pattern formation; Differentiation and growth; Differential gene expression; Cytoplasmic determinants and asymmetric cell division.

UNIT-II: Early Embryonic Development

Gametogenesis (Spermatogenesis, Oogenesis); Types of eggs; Egg membranes; Fertilization: Changes in gametes, monospermy and polyspermy; Planes and patterns of cleavage; Early development of frog and chick up to gastrulation; Fate maps; Embryonic induction and organizers.

UNIT-III: Late Embryonic Development

Fate of germ layers; Extra-embryonic membranes in birds; Implantation of embryo in humans and Placenta (Structure, types and functions of placenta).

UNIT-IV: Post Embryonic Development

Metamorphosis: Changes, hormonal regulations in amphibians; Regeneration: Modes of regeneration (epimorphosis, morphallaxis and compensatory regeneration); Ageing: Concepts and models.

UNIT-V: Implications of Developmental Biology

Teratogenesis: Teratogenic agents and their effects on embryonic development; in vitro Fertilization; Stem cell culture and Amniocentesis.

PRACTICAL - 11

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
3. Study of developmental stages (above mentioned) by raising chick embryo in the laboratory.
4. Study of the developmental stages and life cycle of *Drosophila* from stock culture.
5. Study of different types of placenta.
6. Project report on *Drosophila* culture/chick embryo development.

Recommended Books

1. Balinsky BI and Fabian BC (1981) *An Introduction to Embryology*. 5th Edition. International Thompson Computer Press.
2. Gilbert SF (2010) *Developmental Biology*. 9th Edition. Sinauer Associates, Inc., USA.
3. Kalthoff (2008) *Analysis of Biological Development*. 2nd Edition. McGraw-Hill, New York.
4. Wolpert L, Beddington R, Jessell T, Lawrence P, Meyerowitz E and Smith J (2002) *Principles of Development*. 1st Edition, Oxford University Press, New York.

ZOOLOGY (HONOURS)

SEMESTER-5

PAPER: CC-12

C:12-MOLECULAR BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Nucleic Acids and DNA Replication

Salient features of DNA double helix; Watson and Crick model of DNA; DNA denaturation and renaturation; DNA topology - linking number and DNA topoisomerases; Cot curves; Structure of RNA, tRNA and DNA and RNA associated proteins; DNA Replication in prokaryotes and eukaryotes; Mechanism of DNA replication; Role of proteins and enzymes in replication; Licensing factors; Semiconservative, bidirectional and semi-discontinuous replication; RNA priming; Replication of circular and linear ds-DNA and replication of telomeres.

UNIT-II: Transcription

RNA polymerase and transcription Unit; Mechanism of transcription in prokaryotes and Eukaryotes; Synthesis of rRNA and mRNA; Transcription factors and regulation of transcription. Post Transcriptional Modifications and Processing of Eukaryotic RNA: Structure of globin mRNA; Split genes : Concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing.

UNIT-III: Translation

Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

UNIT-IV: Gene Regulation and Regulatory RNAs

Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencers elements; Gene silencing, Genetic imprinting; Ribo-switches, RNA interference, miRNA and siRNA.

UNIT-V: Elementary idea on Biotechnology:

Recombinant DNA technology, molecular analysis of DNA, RNA & protein, DNA sequencing (Sanger & automation method) PCR, DNA finger printing, production of Recombinant vaccines, Transgenic animals (Fish, Livestock)

PRACTICAL-12

1. Study of DNA replication using Photographs or slides and special cases, e.g., Polytenyusing permanent slides of polytene chromosomes.
2. Preparation of liquid culture medium (LB) and raise culture of E. coli.
3. Estimation of the growth kinetics of E. coli by turbidity method.
4. Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking.
5. Demonstration of antibiotic sensitivity/resistance of E. coli to antibiotic pressure and interpretation of results.
6. Quantitative estimation of salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A260 measurement).
7. Quantitative estimation of RNA using Orcinol reaction.

Recommended Books

1. Becker WM, Kleinsmith LJ, Hardin J and Bertoni GP (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2008)Molecular Biology of the Cell, 4th Edition.Garland publishing Inc., New York.
3. Cooper GM and Hausman RE (2007) The Cell: A Molecular Approach. 4th Edition, ASM Press, USA.
4. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition; Lippincott Williams and Wilkins, Philadelphia.
5. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition; John Wiley and Sons. Inc., USA.

ZOOLOGY (HONOURS)

SEMESTER-6

PAPER: CC-13

C:13-IMMUNOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Immune System and Immunity

Historical perspective of Immunology, Early theories of Immunology, Haematopoiesis, Cells and organs of the Immune system; Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity and Immune dysfunctions.

UNIT-II: Antigens

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T -Cell epitopes.

UNIT-III: Immunoglobulins

Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays, Polyclonal sera, Monoclonal antibodies and Hybridoma technology.

UNIT-IV: Major Histocompatibility Complex and Complement System

Structure and functions of endogenous and exogenous pathway of antigen presentation; Components and pathways of complement activation.

UNIT-V: Cytokines, Hypersensitivity and Vaccines

Properties and functions of cytokines; Cytokine-based therapies; Gell and Coombs classification and Brief description of various types of hypersensitivities; Types of vaccines: Recombinant vaccines and DNA vaccines.

PARCTICAL-13

1. Demonstration of lymphoid organs.
2. Ouchterlony's double immuno-diffusion method.
3. Determination of ABO blood group.
4. Preparation of single cell suspension of splenocytes from chick spleen, cell counting and viability test.
5. ELISA/ dot Elisa (using kit).
6. Principles, experimental set up and applications of immuno-electrophoresis, RIA, F.

Recommended Books

1. Abbas KA and Lichtman HA (2003) Cellular and Molecular Immunology. 5th Edition. Saunders Publication, Philadelphia.
2. David M, Jonathan B, David RB and Ivan R (2006) Immunology. 7th Edition. Elsevier Publication, USA .
3. Kindt TJ, Goldsby RA, Osborne BA and Kuby J (2006) Immunology. 6th Edition. W.H. Freeman and Company, New York.

ZOOLOGY (HONOURS)

SEMESTER-6

PAPER: CC-14

C:14-EVOLUTIONARY BIOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: History of Life, theories of Evolution and Extinction

Chemogeny, Biogeny, RNA World, Major Events in History of Life; Lamarckism; Darwinism; NeoDarwinism; Background of extinction, Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail) and Role of extinction in evolution.

UNIT-II: Evidences of Evolution

Fossils and its types; Dating of fossils, Phylogeny of horse and human; Molecular evidences (Globin gene families as an example) and Molecular clock concept.

UNIT-III: Processes of Evolutionary Change

Organic variations; Isolating mechanisms; Natural selection (Industrial melanism, Pesticide/Antibiotic resistance); Types of natural selection (Directional, Stabilizing, Disruptive), Sexual Selection and Artificial selection.

UNIT-IV: Principles of population genetics

Concept of gene pool, Gene frequencies equilibrium frequency (Hardy-Weinberg equilibrium), Shift in gene frequency without selection Genetic drift, Mutation pressure and Gene flow and Shifts in gene frequencies with selection.

UNIT-V: Species Concept and Evolution above species level

Biological concept of species (Advantages and Limitations); Sibling species, Polymorphic species, Polytypic species, Ring species; Modes of speciation (Allopatric, Sympatric); Macro-evolutionary Principles (Darwins Finches); Convergence, Divergence and Parallelism.

PRACTICAL -14

1. Study of fossil evidences from plaster cast models and pictures.
2. Study of homology and analogy from suitable specimens/ pictures.
3. Demonstration of changing allele frequencies with and without selection.
4. Construction of cladogram based on morphological characteristics.
5. Construction of phylogenetic tree with bioinformatics tools (Clustal X and Phylip).
6. Interpretation of phylogenetic trees.

Recommended Books

1. Barton NH, Briggs DEG, Eisen JA, Goldstein DB and Patel NH (2007) Evolution. Cold Spring Harbour Laboratory Press.
2. Campbell NA and Reece JB (2011) Biology. 9th Edition. Pearson Education Inc., New York.
3. Douglas JF (1997) Evolutionary Biology. Sinauer Associates, USA.
4. Hall BK and Hallgrimsson B (2008) Evolution. 4th Edition. Jones and Bartlett Publishers, USA.
5. Pevsner J (2009) Bioinformatics and Functional Genomics. 2nd Edition. Wiley-Blackwell, USA.
6. Ridley M (2004) Evolution. 3rd Edition. Blackwell Publishing, USA.

ZOOLOGY (HONOURS)

SEMESTER-5

DISCIPLINE SPECIFIC ELECTIVE (DSE:1)-ANIMAL BEHAVIOUR

Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction and Mechanisms of Behaviour

Origin and history of Ethology; Brief profiles of Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen; Proximate and ultimate behavior; Objective of behaviour, Behaviour as a basis of evolution; Behaviour as a discipline of science; Innate behaviour, Instinct, Stimulus filtering, Sign stimuli and Code breakers.

UNIT-II: Patterns of Behaviour

Reflexes: Types of reflexes, reflex path, characteristics of reflexes (latency, after discharge, summation, fatigue, inhibition) and its comparison with complex behavior.

Orientation: Primary and secondary orientation; kinesis-orthokinesis, klinokinesis; taxistropotaxis and klinotaxis and menotaxis (light compass orientation) and mnemotaxis.

Learning: Associative learning, classical and operant conditioning, Habituation and Imprinting.

UNIT-III: Social Behaviour

Insects society; Honey bee: Society organization, polyethism, foraging, round dance, waggle dance, Experiments to prove distance and direction component of dance, learning ability in honey bee, formation of new hive/queen; Reciprocal altruism, Hamiltons rule and inclusive fitness with suitable examples.

UNIT-IV: Sexual Behaviour

Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Infanticide, Consequences of mate choice for female fitness, Sexual conflict for male versus female parental care and Courtship behaviour in three spine stickleback.

UNIT-V: Biological Clocks

Circadian rhythm, Tidal rhythm, Lunar rhythm, Advantages of biological clocks, Jet lag and Entrainment.

PRACTICAL- DSE-1

1. To study different types of animal behaviour such as habituation, social life, courtship behaviour in insects, and parental care from short videos/movies and prepare a short report.
2. To study nests and nesting habits of the birds and social insects.
3. To study the behavioural responses of wood lice to dry condition.
4. To study behavioural responses of wood lice in response to humid condition.
5. To study geotaxis behaviour in earthworm.
6. To study the phototaxis behaviour in insect larvae.
7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.

Recommended Books

1. David McF. Animal Behaviour. Pitman Publishing Limited, London, UK.
2. John A (2001) Animal Behaviour. 7th Edition. Sinauer Associate Inc., USA.
3. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge University Press, USA.
4. Paul WS and John A (2013) Exploring Animal Behaviour. 6th Edition. Sinauer Associate Inc., Massachusetts, USA.

ZOOLOGY (HONOURS)

SEMESTER-5

DSE:2-ECONOMIC ZOOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroths/Newton's hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Diseases of honey bee, American and European Foulbrood, and their management; Honey extraction techniques; Physicochemical analysis of honey; Other beneficial products from bee; Visit to an apiculture institute and honey processing Units.

UNIT-II: Silk and Silk Production (Sericulture)

Different types of silk and silkworms in India; Rearing of Bombyx mori, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles and their management; Silk reeling techniques and Quality assessment of silk fibre.

UNIT-III: Aquaculture I

Brood stock management; Induced breeding of fish; Management of hatchery of fish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products.

UNIT-IV: Aquaculture II

Prawn farming; Culture of crab; Pearl culture and Culture of air breathing fishes.

UNIT-V: Dairy and Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy or poultry farm management and business plan; Visit to any dairy farm or Poultry farm. Submission of report on any one field visits mentioned above.

PRACTICAL-DSE-2

1. Study of different types of bees (Queens, Drones and Worker bees).
2. Study of different types of silk moths.
3. Study of different types of pearls.
4. Study of different types of fish diseases.
5. Identification of different types of scales in fishes.
6. Study of different types of fins.
7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
8. Identification of various types of natural silks.

Recommended Books

1. Dhyan Singh Bisht, Apiculture, ICAR Publication.
2. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
3. Hafez ESE (1962) Reproduction in Farm Animals. Lea and Fabiger Publishers.
4. Knobil E and Neill JD (2006) The Physiology of Reproduction. Vol. 2. Elsevier Publishers, USA.
5. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
6. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.
7. Srivastava CBL (1999) Fishery Science and Indian Fisheries. Kitab Mahal publications, India.

ZOOLOGY (HONOURS)

SEMESTER-6

DSE:3-MICROBIOLOGY

(Credits:6, Theory:4, Practical:2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I:

History of Microbiology; Microbial World Characterization, Classification and identification of microbes.

UNIT-II:

Prokaryotes: General morphology and classification of bacteria, their characters and economic importance; Gram-positive and Gram-negative bacteria.

UNIT-III:

Eukaryotes: General morphology of Protista and Fungi classification and economic importance.

UNIT-IV:

Viruses: structure, genome, replication cycle; Epidemiology of infectious diseases with reference of human hosts Bacterial (Tuberculosis), Viral (Hepatitis), Protozoan (Amoebiasis) and Fungal (any one) disease.

UNIT-V:

Microbe interactions-Immune Responses-Antibiotics and other chemotherapeutic agents; Applied microbiology in the fields of food, agriculture, industry and environment.

PRATICAL -DSE-3

1. Cleaning of glasswares, sterilisation principle and methods - moist heat - dry heat and filtration methods.
2. Media preparation: Liquid media, Solid media, Agar slants, Agar plates. Basal, enriched, selective media preparation - quality control of media, growth supporting properties, sterility check of media.
3. Pure culture techniques: Streak plate, pour plate and decimal dilution.
4. Cultural characteristics of microorganisms: Growth on different media, growth characteristics and description and demonstration of pigment production.
5. Staining techniques: Smear preparation, simple staining, Grams staining, Acidfast staining and staining for meta chromatic granules.
6. Morphology of microorganisms.
7. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.
8. Physiology characteristics: IMViC test, H₂S, Oxidase, catalase, urease test, Carbohydrate fermentation, Maintenance of pure culture, Paraffin method, Stab culture and maintenance of mold culture.

Recommended Books

1. Ahsan J and Sinha SP (2010) A Hand book on Economic Zoology. S Chand, NewDelhi.
2. Arora DR and Arora B (2001) Medical Parasitology.2nd Edition.CBS Publications and Distributers.
3. Atwal AS (1993) Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana.
4. Dubey RC and Maheshwari DK (2013) A Textbook of Microbiology. S. Chand, New Delhi.
5. Dunham RA (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications.
6. Pelczar MJ, Chan ECS and Krieg NR (1993) Microbiology.5th Edition, Tata McGraw Hill Publishing Co.Ltd.
7. Pradhan, S (1983) Insect Pests of Crops. National Book Trust of India, New Delhi.
8. Shukla, G.S. and Upadhya, V.B. (2013) Economic Zoology. 5th Edition, Rastogi Publications, Meerut.

ZOOLOGY (HONOURS)

SEMESTER-6

DSE:4-PROJECT WORK

(Credits:6, Max. Marks:100)

GENERIC ELECTIVE PAPERS (GE)

ZOOLOGY (GE)

SEMESTER-2

GE-1: ANIMAL DIVERSITY (NON-CHORDATE), PHYSIOLOGY AND ENDOCRINOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

General characteristics and classification up to classes and study of types mentioned

UNIT-I:

Protozoa: Paramecium with reference to structure and reproduction.

Porifera: Structure of Sycon and Canal system in sponges.

Cnidaria: Structure, reproduction and life cycle of Aurelia.

UNIT-II:

Platyhelminthes: Structure, reproduction and life cycle of Fasciola.

Nemathelminthes: Structure, reproduction and life cycle of Ascaris.

Annelida: Structure, digestion and excretion of Hirudinaria.

UNIT-III:

Arthropoda: External morphology, digestive and excretory system of Paleamon. Mollusca: Morphology and respiration of Pila.

Echimodermata: Morphology and water vascular system of Asterias. UNIT-IV: Mammalian Physiology
Digestion, Respiration, Transport of respiratory gases, Structure of heart and cardiac cycle, Composition and clotting of blood, Blood group, Structure of neuron and transmission of nerve impulse, Structure of skeletal muscle and muscle contraction.

UNIT-V: Endocrinology

Structure and function of Pituitary, Thyroid and Gonads.

Note: Classification to be followed from " Barnes RD (1982) Invertebrate Zoology. 5th Edition."

PRACTICAL-GE-1

Experiment (Physiology) Estimation of haemoglobin concentration in man, Estimation of casein in milk, Estimation of lipid in any given sample.

Endocrinology slides as mentioned in syllabus Museum Specimens and slides Slides: Morphology of Paramecium, Binary fission and Conjugation in Paramecium. Section through Sycon, Spicules and Gemmules of sponge, Ephyra larva.

Museum specimens: Spongilla, Sycon, Gorgonia, Physallia, Porpita, Penatulla, Nereis, Aphrodite, Sacculina, Eupagurus, Chiton, Aplysia, Octopus, Starfish, sea-Urchin, sea Cucumber.

Recommended Books

1. Arora MP (2006) Non-Chordata-I. 1st edition. Himalaya Publishing House, New Delhi.
2. Arora MP (2008) Non-Chordata-II. 1st edition. Himalaya Publishing House, New Delhi.
3. Barnes RD (1982) Invertebrate Zoology. 6th Edition. Holt Saunders International Edition.
4. Barnes RSK, Calow P, Olive PJW, Golding DW & Spicer JI (2002) The Invertebrates: A New Synthesis. 3rd Edition. Blackwell Science, USA.
5. Barrington EJW (1979) Invertebrate Structure and Functions. 2nd Edition. ELBS and Nelson.
6. Boradale LA and Potts EA (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Jordan EL and Verma PS (1963) Invertebrate Zoology. Revised Edition. S. Chand, New Delhi.
8. A text book of medical Physiology. Guyton and Hall.
9. Human physiology. Chatterjee.
10. Principle of Anatomy and Physiology. Tortora and Derrickson.
11. A book of Physiology and Functional Histology, A K berry.
12. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

ZOOLOGY (GE)

SEMESTER-4

GE-2: ANIMAL DIVERSITY (PROTOCHORDATA, CHORDATA), DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Protochordata and Origin of Chordates

General characters of Hemichordata, Urochordata and Cephalochordata; Structure, Digestive system, Respiratory and reproduction in Balanoglossus, Herdmania and Amphioxus.

UNIT-II: Pisces and Amphibia

General characters of Chondrichthyes and Osteichthyes and classification up to order; Digestive and reproductive system in Scoliodon General characters and classification of amphibian up to order, Circulatory and Nervous system (Brain and Cranial nerves).

UNIT-III: Reptilia, Aves and Mammals

Urinogenital system of Calotes; Respiratory system of Pigeon and Flight adaptation in Birds; Digestive and Nervous System (Brain and Cranial nerves) of rabbit.

UNIT-IV: Developmental Biology

Gametogenesis, structure of gametes, Mechanism of fertilization, Types of Cleavage, Development of Amphioxus and frog up to formation of three germ layers.

UNIT-V: Immunology

Innate and acquired immunity, Antigens, structure and function of immunoglobulins, Antigen- Antibody interaction, Vaccines.

PRACTICAL: GE-2

Immunology: Blood Grouping

Museum specimens: Balanoglossus, Herdmania, Amphioxus, Exocoetus, Hippocampus, Anabas, Ambystoma, Axolotl larva, Polypedates, Ichthyophis, Draco, Chelone, Trionyx, Hemidactylus, Varanus, Chamaeleon, Sea snake, Cobra, Viper, Krait, Pigeon, Crow, Bat, Rat.

Slides: Sections through Balanoglossus and Amphioxus; Tissue sections through Liver, Pancreas; Embryological slides of frog.

Bones: Amphibia and mammals.

Recommended Books

1. Agarwal VK (2011) Zoology for degree students. S. Chand, NewDelhi.
2. Arora MP (2006) Chordata-1. 1st Edition. Himalaya Publishing House, New Delhi.
3. Hall BK and Hallgrimsson B (2008) Strickbergers Evolution. 4th Edition. Jones and Bartlett Publishers Inc., USA.
4. Jordan EL and Verma PS (1963) Chordate Zoology. Revised Edition.S. Chand, New Delhi.
5. Young JZ (2004) The Life of Vertebrates. 3rd Edition. Oxford University Press, USA.
6. Kindt TJ, Goldsby RA, Osborne BA, Immunology.
7. Gilbert SF, Developmental Biology.

ZOOLOGY (GE)

GE-3: FOOD, NUTRITION AND HEALTH

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I:

Food; Diet; Nutrient; Vitamins; Disorders due to deficiency of vitamins; Synthetic foods and drinks.

UNIT-II:

Functions of food; Components of food; Nutrients (Macro and micronutrients): their biochemical role and dietary sources; Food groups and the concept of a balanced diet; Causes of food spoilage; Food adulteration; Nutrition through the life cycle- Physiological considerations, nutrient needs and dietary pattern for various groups adults, pregnant and nursing mothers, infants, preschool and school children, adolescents and elderly.

UNIT-III:

Nutritional Biochemistry Carbohydrates, Lipids, Proteins - Definition, Classification, Structure and properties Significance of acid value, iodine value and saponification value of lipids; Essential and Non-essential amino acids; Enzymes- Definition, Classification, Properties; Coenzymes Vitamins Fat-soluble and Water-soluble vitamins; their Structure and properties Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc and their properties.

UNIT-IV:

Introduction to health- Definition and concept of health; Major nutritional deficiency Diseases: Protein Energy Malnutrition; Life style related diseases- hypertension, diabetes mellitus, and obesity their causes and prevention through dietary or lifestyle modifications.

Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS);

Common ailments- cold, cough, fevers, diarrhoea, constipation: their causes and dietary treatment.

UNIT-V:

Food hygiene, Potable water- sources and methods of purification, Food and Water Borne Infections.

PRACTICAL- GE-3

1. To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric.
2. To determine absorbed oil content in fried foods.
3. Estimation of lactose in milk.
4. Ascorbic acid estimation in food by titrimetry.
5. Estimation of calcium in foods by titrimetry.
6. Preparation of temporary mounts of various stored grain pests.
7. Project- Undertake computer aided diet analysis and nutrition counselling for different age groups. OR
Identify nutrient rich sources of foods, their seasonal availability and price; study of Nutrition labelling on selected foods.

Recommended Books

1. Bamji MS, Rao NP and Reddy V (2009) Text Book of Human Nutrition. Oxford & IBH Publishing Co. Pvt Ltd.
2. Jain P et al. (2007) Poshan vaswasthya ke mool siddhant (Hindi). 1st Ed. Academic Pratibha.
3. Lakra P and Singh MD (2008) Text book of Nutrition and Health. 1st edition. Academic Excellence.
4. Manay MS, Shadaksharaswamy (1998) Food-Facts and Principles. New Age International (P) Ltd.
5. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.
6. Mudambi SR and Rajagopal MV (2007) Fundamentals of Foods, Nutrition and Diet Therapy. 5th Edition. New Age International Publishers.
7. Srilakshmi B (2002) Nutrition Science. New Age International (P) Ltd.
8. Srilakshmi B (2007) Food Science. 4th Edition. New Age International (P) Ltd.
9. Swaminathan M (1986) Handbook of Foods and Nutrition. 5th Edition. BAPPCO.
10. Wardlaw GM, Hampl JS (2007) Perspectives in Nutrition. 7th Edition. McGraw Hill.

ZOOLOGY (GE)

GE-4: BIOTECHNOLOGY: MICROBES TO ANIMALS

(Credits:6, Theory-4, Practical-2)

Lectures: 60 (Theory:40, Practical:20)

Max. Marks:100 (Theory:70, Practical:30)

UNIT-I: Introduction

Concept and scope of Biotechnology; Importance of biotechnology and Application of biotechnology.

UNIT-II: Techniques in Gene Manipulation

Restriction and modifying enzymes, Cloning vectors and Expression vectors, Transformation techniques, Identification of recombinants, Construction and screening of DNA libraries; Molecular analysis of DNA, RNA and proteins (i.e., Southern, Northern and Western blotting), DNA sequencing (Sangers method and automation), Polymerase Chain Reaction, Microarrays, DNA fingerprinting and RAPD.

UNIT-III: Microbes in Biotechnology

Growth kinetics of microbes, Applications of microbes in industry (Concept of primary and secondary metabolites, Fermentation/Bioreactors, Downstream processing), Bioremediation and Biosensing.

UNIT-IV: Transgenic Animal

Production of transgenic animals: Retroviral method, DNA microinjection method, embryonic stem cell method, nuclear transplantation; Applications of transgenic animals; Knockout mice; Transgenic livestock and Transgenic fish.

UNIT-V: Biotechnology and Human Welfare

Animal cell technology: Concept of expressing cloned genes in mammalian cells, Recombinant DNA in health (Recombinant insulin and human growth hormone), Production of recombinant vaccines, Gene therapy: in vitro, in-vivo and ex-vivo. Ethical issues concerning: Transgenesis, Bio safety and Intellectual Property Rights.

PRACTICAL-GE-4

1. Isolation of genomic DNA from E. coli and analyze it using agarose gel electrophoresis.
2. Isolation of plasmid DNA (pUC 18/19) and analyse it using agarose gel electrophoresis.
3. Transformation of E. coli (pUC 18/19) and calculation of transformation efficiency.
4. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
5. DNA ligation (lambda DNA EcoR1/Hind III digested).
6. Construction of restriction digestion maps from data provided.
7. Study of Southern blot hybridization and PCR; Analysis of DNA fingerprinting (Dry Lab).
8. Project on Animal Cell Culture.

Recommended Books

1. Beauchamp TI and Childress JF (2008) Principles of Biomedical Ethics.6th Edition. Oxford University Press, USA.
2. Brown TA (1998) Molecular Biology Labfax II: Gene Cloning and DNA Analysis. 2nd Edition. Academic Press, USA.
3. Glick BR and Pasternak JJ and Patten CL (2009) Molecular Biotechnology- Principles and Applications of Recombinant DNA. 4th Edition. ASM press, Washington, USA.
4. Griffiths AJF, Miller JH, Suzuki DT, Lewontin RC and Gelbart WM (2009) An Introduction to Genetic Analysis. 9th Edition. W.H. Freeman and Co., USA.
5. Snustad DP and Simmons MJ (2009) Principles of Genetics.5th Edition, John Wiley and Sons Inc., USA.
6. Watson JD, Myers RM, Caudy A and Witkowski JK (2007) Recombinant DNA- Genes and Genomes- A Short Course. 3rd Edition, Freeman and Co., USA.

Ability Enhancement Compulsory Course-I (AECC-I)

ENVIRONMENTAL SCIENCE

SEMESTER – I

FOR +3 ARTS, SCIENCE & COMMERCE - 2016

FULL MARKS: 100

TIME: 3 HOURS

TIME: 1 HOUR

END SEMESTER: 80

MID SEMESTER: 20

Unit - I

The Environment: The Atmosphere, Hydrosphere, Lithosphere, Biosphere, Ecology, Ecosystem, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).

Unit – II

Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

Unit – III

Population Ecology: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

Unit- IV

Environmental Movements in India: Grassroot Environmental movements in India, Role of women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

Unit – V

Natural Resources: Conservation of Natural Resources, Management and Conservation of Wildlife, Soil Erosion and Conservation, Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act, 1972, Environment Protection, 1986.

SEMESTER-II

AECC-II: MIL Communication (Oriya/Hindi/AE)

Max. Marks:100 (End-Sem.:80 Marks, Mid-Sem.: 20 Marks)

(Detailed syllabus for this paper is available in MIL Odia/Hindi Communication syllabus).

ଦକ୍ଷତାବର୍ଦ୍ଧକ ବାଧ୍ୟତାମୂଳକ ପାଠ୍ୟକ୍ରମ
Ability Enhancement Compulsory Course (AECC)
ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା - ଓଡ଼ିଆ
(୨୦୧୭-୧୭)

MIL Communications - Odia
ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (2nd Semester) କଳା ଓ ବିଜ୍ଞାନ
(ସାଧାରଣ Pass/ ସମ୍ମାନ Hons) ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ଆସ୍ଥାମୂଲ୍ୟାଙ୍କ-୪, ମୋଟ ଶ୍ରେଣୀ ପାଠଦାନ ନିର୍ଦ୍ଦେଶ - ୪୦, ଗୋଟିଏ ଶ୍ରେଣୀ ପାଠଦାନର
(ପିରିୟଡ୍) ସମୟ ଅବଧି - ୪୫ ମିନିଟ୍, ପାଠ୍ୟକ୍ରମ - ୨, ପୂର୍ଣ୍ଣମାର୍କସ - ୧୦୦

(Credits - 4) Total Classes - 40, One Period - 45 Mins, Course - II, Full Marks - 100

ପାଠ୍ୟକ୍ରମର ଭୂମିକା:

ଏହି ପାଠ୍ୟଖଣ୍ଡଟି ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ (CBCS / ସିବିସିଏସ୍) ପାଠ୍ୟ ପ୍ରଣାଳୀ ଅନୁସାରେ ପ୍ରସ୍ତୁତ ହୋଇଛି । ବିଭିନ୍ନ ସ୍ତରରେ ଆବଶ୍ୟକ ଅନୁସାରେ ସମସାମୟିକ ପରିସ୍ଥିତିକୁ ନେଇ ଭାବବିନିମୟ ଓ ପାରସ୍ପରିକ ଯୋଗାଯୋଗ ସ୍ଥାପନ କିପରି ଓଡ଼ିଆ ଭାଷାରେ ସହଜରେ, ସରଳରେ ଓ ଆନନ୍ଦରେ ହୋଇପାରିବ - ଏ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ସଦ୍ୟତମ ପ୍ରାୟୋଗିକ ଜ୍ଞାନର ବିକାଶ ନିମିତ୍ତ +୩ ସୁରାୟ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଏହି ପାଠ୍ୟକ୍ରମର ଖଣ୍ଡଟି ସାହାଯ୍ୟ କରିବ । ସେଥିପାଇଁ ପ୍ରଚଳିତ ଭାଷାର ବୈୟାକରଣିକ, ବ୍ୟାବହାରିକ ଓ ପ୍ରାୟୋଗିକ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଏଥିରେ ସଂଯୋଗ ପ୍ରକ୍ରିୟାର ଅନୁବିଧି, ଯୋଗାଯୋଗର ତଥ୍ୟ ଓ ତତ୍ତ୍ୱ ପ୍ରତି ଗୁରୁତ୍ୱ ଦିଆଯାଇଛି । ଏହା ବିଦ୍ୟାର୍ଥୀଙ୍କ ଭାବବିନିମୟମୂଳକ ଦକ୍ଷତା ବୃଦ୍ଧିରେ ସାହାଯ୍ୟ କରିବ । ସେମାନେ ଶୁଦ୍ଧ ଓ ପରିଚ୍ଛନ୍ନ ଭାବରେ ଯେକୌଣସି ପ୍ରକାର ଜ୍ଞାନର ସୂଚନା ତଥ୍ୟ ଓ ସିଦ୍ଧାନ୍ତକୁ ମୌଖିକ ଓ ଲିଖିତ ସ୍ତରରେ ସହଜରେ ପ୍ରକାଶ କରିପାରିବେ ଏବଂ ସେମାନଙ୍କ ମାତୃଭାଷାର ବିକାଶ ଘଟିପାରିବ ।

ମୂଲ୍ୟାଙ୍କନ ବିଭାଜନ ପଦ୍ଧତି :

କ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ଅକ୍ଷତଃ ଦୁଇଟି ଲେଖାଏଁ ମୋଟ ୧୦ଟି ୧୨ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଯେକୌଣସି ୫ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ପଡ଼ିବ ।

$$(୧୨ \times ୫ = ୬୦)$$

ଖ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକରୁ ୧୫ଟି ଅତିସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ପଡ଼ିବ ।

$$(୧୦ \times ୨ = ୨୦)$$

ଗ) ମହାବିଦ୍ୟାଳୟ ସୁରାୟ ଆକ୍ରମ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା

$$(୨୦)$$

ମୋଟ ମୂଲ୍ୟାଙ୍କନ - ୧୦୦

ସବିଶେଷ ପାଠ୍ୟ

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ (AECC)

ପାଠ୍ୟ-୧ / Course – 1 : ଯୋଗାଯୋଗ ଅନୁବିଧି, ରୀତି ଓ ମାଧ୍ୟମ

୧ମ ଏକକ : ଯୋଗାଯୋଗର ପରିଭାଷା, ଅନୁବିଧି, ପରିସର ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ସାକ୍ଷାତଦଳାର, ଦଳଗତ ଆଲୋଚନା ଓ ଚର୍ଚ୍ଚାବିତର୍କ

୩ୟ ଏକକ : ଭାଷଣ କଳା, ଘୋଷଣା କଳା ଓ କଥନକଳା

୪ର୍ଥ ଏକକ : ସମ୍ବାଦର ପରିଭାଷା, ପରିସର ଓ ଶଶମାଧ୍ୟମଧର୍ମୀ ସମ୍ବାଦ ପ୍ରସ୍ତୁତି

୫ମ ଏକକ : ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣମାଳା ଓ ବର୍ଣ୍ଣଶୁଦ୍ଧିର କାରଣ ଓ ନିରାକରଣ ।

(ବନାନ ତୁଟି ଓ ଏହାର କାରଣ - ସାଦୃଶ୍ୟଜନିତ ଅଶୁଦ୍ଧି, ଲିଙ୍ଗଗତ ଅଶୁଦ୍ଧି, ସନ୍ଧିଗତ ଅଶୁଦ୍ଧି, ସମାସଗତ ଅଶୁଦ୍ଧି, ବଚନ ଓ ବିଭକ୍ତିଗତ ଅଶୁଦ୍ଧି, ବାକ୍ୟ ବିଧିଜନିତ ଅଶୁଦ୍ଧି, ସମାର୍ଥବୋଧକ ଶବ୍ଦାଶୁଦ୍ଧି, ପ୍ରତ୍ୟୟ ଜନିତ ଅଶୁଦ୍ଧି, ଶବ୍ଦ ସଂଯୋଗାତ୍ମକ ଓ ସ୍ଵରସଙ୍ଗତି ଜନିତ ଅଶୁଦ୍ଧି - ଏସବୁର ନିରାକରଣ ଉପାୟ ବହୁ ପ୍ରଚଳିତ ବିଧାନ ଓ ଶୁଦ୍ଧାଶୁଦ୍ଧ ବିସ୍ତର ।)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଶବ୍ଦର ଆକାଶ ଓ ଦୃଶ୍ୟର ଦିଗ୍‌ବଳୟ - ଶତପଥୀ ରବି, କଟକ
୨. ମଞ୍ଚ ଓ ନାଟକର କଳାକୌଶଳ - ସାହୁ, ନାରାୟଣ, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟପୁସ୍ତକ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା
୩. ଲିଖନକଳା ଓ ପ୍ରାୟୋଗିକ ବ୍ୟାକରଣ - ମିଶ୍ର, ଅଜୟ କୁମାର, କଲ୍ୟାଣୀ ପବ୍ଲିଶିଂସ୍, କଟକ
୪. ପ୍ରାୟୋଗିକ ଓଡ଼ିଆ ଭାଷା - ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରୟୋଗନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ଵର
୫. ପୁସ୍ତକ ରଚନାବିଧି - ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରୟୋଗନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ଵର
୬. ନିର୍ଭୁଲ ଲେଖାର ମୂଳସୂତ୍ର - ହରିଚନ୍ଦନ ନାଳାହିତୁଷଣ, ପି.ସି.ଆର୍ ପବ୍ଲିକେଶନ, ଭୁବନେଶ୍ଵର
୭. ସଂଯୋଗ ଅନୁବିଧି / ବ୍ୟାବହାରିକ ଓଡ଼ିଆ ଭାଷା ଓ ପ୍ରାୟୋଗାତ୍ମକ ବ୍ୟାକରଣ - ତ୍ରିପାଠୀ ସନ୍ତୋଷ, ନାଲନ୍ଦା, କଟକ
୮. ଓଡ଼ିଆ ପ୍ରକାଶନ ଓ ପ୍ରସାରଣର ଇତିହାସ - ମହାପାତ୍ର ଶ୍ରୀଧର, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ
୯. ସାରସ୍ଵତ ସାକ୍ଷାତକାର - ସିଂହ ବିଜୟାନନ୍ଦ, ବିଦ୍ୟାପୁରୀ, କଟକ
୧୦. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା-ମହାପାତ୍ର ଚନ୍ଦ୍ରଶେଖର, ଓଡ଼ିଶା ପାଠ୍ୟପୁସ୍ତକ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ଵର
୧୧. ବେତାର ନାଟକ କଳା - ମହାନ୍ତି, ବ୍ରଜମୋହନ, ଓଡ଼ିଶା ବୁକ୍‌ସୋର, କଟକ
୧୨. ଓଡ଼ିଶାର ଥିଏଟର - ସଂ. ଦାଶ ଗୌରାଙ୍ଗ ଚରଣ, କଣ୍ଠେଇ ଘର, ଅନୁଗୋଳ
୧୩. ବାଣିଜ୍ୟିକ ପତ୍ରାବଳୀ - ବେହେରା ଡ. କୃଷ୍ଣଚରଣ, ଫ୍ରେଣ୍ଡ୍‌ସ୍ ପବ୍ଲିଶିଂସ୍
୧୪. ଓଡ଼ିଆ ସାହିତ୍ୟକୁ ଆକାଶବାଣୀର ଦାନ- ମହାନ୍ତି, ବ୍ରଜ ମୋହନ, ଓଡ଼ିଶା ବୁକ୍‌ସୋର, କଟକ
୧୫. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା (ଓଡ଼ିଆ) ସାମଲ, ବିରଞ୍ଚି ନାରାୟଣ, ସତ୍ୟନାରାୟଣ ବୁକ୍‌ସୋର, କଟକ ।

SEC - 1
Skill Enhancement Compulsory Course for Science
English Communication
Semester -3
Marks: 100 (Mid Sem-20, End Sem-80)
Credits: 04

The purpose of this course is twofold: to train students in communication skills and to help develop in them a facility for communicative English.

Since language is which binds society together and serves as a crucial medium of interaction as well as interchange of ideas and thoughts, it is important that students develop a capacity for clear and effective communication, spoken and written, at a relatively young age. The need has become even more urgent in an era of globalization and the increasing social and cultural diversity that comes with it.

English, being a global language par excellence, it is important that any course in communication is tied to an English proficiency programme. The present course will seek to create academic and social English competencies in speaking, listening, arguing, enunciation, reading, writing and interpreting, grammar and usage, vocabulary, syntax, and rhetorical patterns. Students, at the end of the course, should be able to unlock the communicator in them by using English appropriately and with confidence for further studies or in professional spheres where English is the indispensable tool of communication.

UNIT- I

20 Marks

Introduction

1. What is communication?
2. Types of communication
 - Horizontal
 - Vertical
 - Interpersonal
 - Grapevine
3. Uses of Communication

Prescribed Reading: Chapter 1 *Applying Communication Theory for Professional Life: A Practical Introduction* by Dainton and Zelle

http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fV_Ghlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563

UNIT- II

20 Marks

Language of Communication

1. Verbal: spoken and written
2. Non-verbal
 - Proxemics
 - Kinesics
 - Haptics
 - Chronemics

Paralinguistics

3. Barriers to communication
4. Communicative English

UNIT-III

20 Marks

Reading Comprehension

- Locate and remember the most important points in the reading
- Interpret and evaluate events, ideas, and information
- Read “between the lines” to understand underlying meanings
- Connect information to what they already know

UNIT-IV

20 Marks

Writing

- Expanding an Idea
- Note Making
- Information Transfer
- Writing a Memo
- Writing Formal Email
- Writing a Business Letter
- Letters to the Editor
- CV & Resume Writing
- Covering Letter
- Report Writing
- News Story
- Interviewing for news papers

(The above-mentioned writing activities are covered in the prescribed textbook *Vistas and Visions*)

UNIT –V: Language functions in listening and conversation 20 Marks

1. Discussion on a given topic in pairs
2. Speaking on a given topic individually
3. Group Discussion
4. Interview
5. Dialogue

(Practice to be given using the set pieces from the prescribed textbook *Vistas and Visions*)

Grammar and Usage

1. Phrasal Verbs
2. Collocation
3. Using Modals
4. Use of Prepositions
5. Common Errors in English Usage

(The above-mentioned grammar items are covered in the textbook *Vistas and Visions*)

Examination pattern

Each reading and writing question will invite a 200 word response.

Midterm test**[20 marks]**

Unit 1 (preferably short questions on types and uses of communication)

Total 20 marks

Final Semester Examination

Unit 2	One long question with choice	01x 10 qns= 10 marks
	Two short notes with choice	02x 05 qns= 10 marks
Unit 3	Reading: 04 questions meant to test the given reading skills prescribed under unit 3 (2 prose and 2 poetry questions)	04 x 05 qns= 20 marks
Unit 4	Writing: 02 questions	02x 10 qns = 20 marks
Unit 5	Grammar & Usage	02x10 qns = 20 marks
		Total = 80 marks

Grammar questions must be set in contexts; not as isolated sentences as used for practice in the prescribed textbook.

Book Prescribed:

Vistas and Visions: An Anthology of Prose and Poetry. (Ed.)Kalyani Samantray, Himansu S. Mohapatra, Jatindra K. Nayak, Gopa Ranjan Mishra, Arun Kumar Mohanty. OBS

Texts to be studied**Prose**

The Gold Frame
Lifestyle English
Need for Excellence
Ecology and Community
My Lost Dollar

Poetry

The Darkling Thrush
The Felling of the Banyan Tree
Another Woman
Meeting Poets

All grammar and writing activities in the textbook *Vistas and Visions*

Recommended Reading:

Fluency in English – Part II, OUP, 2006

Business English, Pearson, 2008

Communicative English. E. Suresh Kumar and P. Sreehari

Break Free: Unlock the Powerful Communicator in You. Rajesh, V.

Rupa, 2015 *Soft Skills* Shalini Verma, 2009.

Language, Literature and Creativity, Orient BlackSwan, 2013

Language through Literature. (forthcoming) ed. Gauri Mishra, Dr. Ranajan Kaul, Dr. Brati Biswas

SEC-II

(4TH SEMESTER)

FOR ARTS & SCIENCE (HONS.)

MODERN OFFICE MANAGEMENT

Full marks – 100 (Mid Term-20 End Term-80)

Unit- I: Office

What is a Business Enterprise? What is an Office? Who are Office Staff? What are the most Common Forms of Business Organization? What are the Advantages of Office Work? What are the Categories of Office Career and Job Classifications under Each Category? What are the Specific Skill Requirements for Office Jobs? Duties and Responsibilities of Office Staff

Unit-II: Records Management

Objectives of Record Keeping; What is Filing? What are the Different Kinds of Filing System? Steps in Filing; Indexing; Selecting the Appropriate Filing System; How to handle Incoming & Outgoing Mails

Unit –III: Document/Report Writing

Key points to write a document: The 5w-h plan for writing; Steps in writing workplace documents; Important things to remember when editing seven layout mistakes to avoid; Quick tips for report Writing; Basics of Meetings

Unit-IV: Supervisory Skills

What are the Skills of the Supervisor and How to Acquire Them? Functions of Supervisor Communication Meaning; Process; Communicating Tools; Types, Barriers

Unit-V: Leadership & Motivation

Meaning and Concept; Importance of Leadership; Qualities of a Leader; Relationship & Differences Leadership and Motivation; Organizational Leadership; Leadership Ethics - Traits of an Ethical Leader; Leadership Styles - Important Leadership Styles- Situational Leadership – Emotional Intelligence of Leader; Which Leadership Style to Follow? Influence of Situational Leadership Styles on Subordinate Development;

References:–

1. Office Management By Ankita Bhatia Dr. R. K. Chopra
2. Office Management By Dr. P. Rizwan Ahmed
3. Office Management By R S N Pillai