

Birsa Munda Tribal University, Rajpipla

District: Narmada

School of Science

Syllabus

Bachelor of Science

Third Year

Zoology

1st Year Syllabus

Sr. No.	Paper Code	Paper Name	Hrs./ Week	Marking scheme		Total
				External	Internal	
1	SCC 101 Z01	General Zoology-I	4	70	30	100
2	SCC 102 GCH	General Chemistry	4	70	30	100
3	SCC 103 GPH	General Physics	4	70	30	100
4	SCE 101 BES	Basic Environment Studies	3	70	30	100
5	SFC 101 ENG	English-I	3	70	30	100
6	SPR101 PRA	Practical Module-I	3	50	--	50
7	SPR 102 PRA	Practical Module-I	3	50	--	50
8	SPR 103 PRA	Practical Module-I	3	50	--	50
Total			27	500	150	650

2nd Year Syllabus

Sr. No.	Paper Code	Paper Name	Hrs./ Week	Marking scheme		Total
				External	Internal	
1	SCC 201 Z02	Zoology-II	4	70	30	100
2	SCC 202 Z03	Zoology-III	4	70	30	100
3	SCC 203 OAC	Organic and Analytical Chemistry	4	70	30	100
4	SCC 204IPC	Inorganic and Physical Chemistry	4	70	30	100
5	SFC 201 ENG	English-II	3	70	30	100
6	SPR 201 PRA	Practical Module-II	6	100	--	100
7	SPR 202 PRA	Practical Module-II	6	100	--	100
Total			31	550	150	700

3rd Year Syllabus

Sr. No	Paper Code	Paper Name	Hrs./ Week	Marking scheme		Total
				External	Internal	
1	SCC 301 Z04	Zoology-IV	4	70	30	100
2	SCC 302 Z05	Zoology-V	4	70	30	100
3	SCC 303 Z06	Zoology-VI	4	70	30	100
4	SCC 304Z07	Zoology-VII	4	70	30	100
5	SCC 305Z08	Zoology-VIII	3	70	30	100
6	SCC 306 PRO	Project Evaluation	2	70	30	100
7	SFC 301 ENG	English-III	3	70	30	100
8	SPR 301 PRA	Practical Module-III	09	200	--	200
Total			33	690	210	900

SCC 301 Z04 Zoology-IV Non Chordates		
Unit No.	Content	Hours
1	Type Study (1)Trypanosoma(2)Sea-anemone,(3)Scorpion(4)Grass hopper(5)Sepia	20
2	Amplification of Non Chordate Phyla (Protozoa and Porifera) 1. Protozoa A) Nutrition B) Locomotion C) Economic importance and Status D) Reproduction E) Parasitism F) Protozoa and Human Disease G) Status of Protozoa 2. Porifera. A) Canal system B) Skeleton C) Reproduction D) Economic Importance of Porifera and Sponge Industry E) Regeneration	20
3	3. Coelenterata: A) Polymorphism B) Corals and coral reefs. 4. Platyhelminthes: A) Parasitic adaptations B) Parasitism in Platyhelminthes C) Morphological advances. 5. Nemathelminthes: A) Describe the structure and physiology of Ascaris B) Give an account of important nematode parasites 6. Annelida A) Coelom and Metamerism B) Segmental organs (Nephridia and Coelomoducts) C) Reproduction D) Economic Importance. E) Comparative Accounts of Nereis, Pheretima and Hirudinaria (1.Digestive System 2. Excretory System 3. Reproductive System. F) Regeneration	20

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7. Arthropoda:

- A) Larval forms in crustacea
- B) Metamorphosis and Hormonal control of Metamorphosis in insects.
- C) Insects and diseases
- D) Respiration in Insects
- E) Mouthparts in arthropoda
- F) Economic Importance of Arthropoda
- G) Economic importance of insects

8. Mollusca:

- A) Torsion and detorsion in Mollusca
- B) Molluscan Larvae
- C) Shell in Mollusca
- C) Economic importance of Mollusca

9. Echinodermata:

- A) Water vascular system in Echinodermata
- B) Different larva of Echinodermata
- C) Autotomy and Regeneration
- D) Symmetry in Echinodermata

20

**SCC 302 Z05 Zoology V
(Chordates)**

Unit No.	Content	Hours
1	A. Type Study 1. Scoliodon 2. Pigeon 3. Rat	20
2	B. General topics from Chordates: 1. Protochordata: General account and affinity of cephalochordata and urochordata. 2. Cyclostomata : General characteristics, Classification and affinity 3. Fishes : i) Placoderm ii) Dipnoi iii) Paired fins and their evolutions v) Structure of Ampulla of Lorenzini: membranous labirynth and webberian ossicle. vi) Swim-bladder.	20
3	4. Amphibia : i) Origin of Amphibia ii) Terrestrial vertebrates unsuceesful iii) Neoteny 5. Reptiles : i) Characters of order cotylosauria,Chelonia, Crocodila, Rhyncocephalia ii) Structure of plastron and carapace of Turtles. iii) Essay on Dinosaurs.	20
4	6. Aves: i) Essay on Archaeopteryx, ii) Migration of birds, iii) Ratitae (Flightless birds). iv) Different types of Feathers v) Short notes on synsacrum and Pygo Style. 7. Mammals: i) General characters of (a) Prototheria (b) Metatheria ii) Essay on Aquatic Mammals iii) Essay on Dentition.	20

SCC 303 Z-06

(Biochemistry, Animal Physiology and Histology)

Biochemistry: An elementary knowledge of carbohydrates, proteins, lipids and enzymes.

Unit No.	Content	Hours
1	<p>A. Carbohydrates:</p> <p><u>Introduction</u> <u>Classification</u></p> <p>1) Monosaccharides: General structure, definition, classification, Asymmetry, Mutarotation, isomerism. 2) Disaccharides – occurrence, formation & structure of Maltose, Lactose and Sucrose. Importance of disaccharides 3) Oligosaccharides: Definition and classification. 4) Polysaccharides: Definition and classification. Homopolysaccharides – Starch glycogen, cellulose, chitin. Heteropolysaccharides Mucopoly-saccharides. Importance of carbohydrates</p> <p>B. Proteins :</p> <p>i) Introduction and definition ii) Amino acids: Structure, classification (on the basis of the composition of the side chains or R-group and properties). iii) Classification of protein based on the increasing complexity of structure a) Simple protein b) Conjugated proteins c) Derived proteins iv) Properties of Proteins : Physical, colour, Tests, Odour, Viscosity, Molecular weight, Hydrolysis, Hydration, Coagulation, Salting in and out of protein, Amphoteric nature of protein, oxidation. v) Biological functions of proteins.</p>	20
2	<p>C. Lipids:</p> <p>i) Introduction and definition. ii) Components: (a) Glycerol (b) Fatty acids: Saturated : Butaric, Pamitic; Stearic acids Unsaturated : Crotonic, oleic acids iii) Classification of lipid. a) Simple Lipids: Triglycerides – Fats & Oil Waxes. b) Complex Lipids: Lecithins, Cephalins, Plasmalogens Glycolipids c) Derived Lipids Steroids:– Basic steroid nucleus. iv) Importance of Lipid</p>	20

	<p>D. Enzymes:</p> <ul style="list-style-type: none"> i) Introduction, Definition and chemical nature. ii) Nomenclature and classification iii) Properties of enzymes iv) Mechanism of enzyme action v) Factors affecting enzyme activity vi) Enzyme inhibition. 	
3	<p>Physiology:</p> <ul style="list-style-type: none"> 1. Structure and physiology of vertebrate muscle skeletal, cardiac and smooth muscle. 2. Physiology of blood, composition, blood cells and plasma, Haemopoiesis, Co-agulation, and Respiratory Piments. 3. Respiratory function of blood, Heartbeat, Blood pressure and volume changes in the heart. 4. Formation Urea, composition of urine. 5. Sense organs: Organ of Corti, Physiology of vision. 	20
4	<p>Histology:</p> <p>9. Histology of Endocrine glands of Mammals and their functions.</p> <p>1) Pituitary gland, 2) Thyroid 3) Parathyroid 4) Adrenal gland, 5) Pancreas 6) Testis, 7) Ovary.</p> <p>Histology: Liver, Kidney of Mammals.</p>	20

SCC 304 Z-06 Zoology VI
(Cytology, Genetics and Embryology)

Unit No.	Content	Hours
1	<p>Cytology :</p> <p>A) Tools and Techniques.</p> <p>1) Electron microscope</p> <p>2) Phase contrast Microscope</p> <p>3) Paper chromatography</p> <p>4) Centrifugation.</p> <p>5) Electrophoresis</p>	20
2	<p>Genetics:</p> <p><u>A) Gene structure and functions:</u></p> <p>Gene concept: a) size of the gene. b) Fine structure of the genes. cistron, myton, Recon. c) DNA-RNA chemical nature and structure Recombination.</p> <p>1) Transformation and</p> <p>2) Transduction.</p>	20
3	<p>Genetics:</p> <p><u>B) Mutations:</u></p> <p>1) Types of Mutations</p> <p>2) Chromosomal aberrations.</p> <p>3) Gene mutations</p> <p>C) Genetic code</p> <p>D) Protein synthesis.</p> <p>E) Cytoplasmic inheritance.</p> <p><u>F) Genetics and Animal breeding.</u></p> <p>i) Introduction – inbreeding – out breeding</p> <p>ii) Out – breeding for special types.</p> <p>iii) Hybrid vigour (Hetrosis)</p> <p><u>G) Human Genetics and Chromosomal abnormalities –</u></p> <p>1) Karyotyping of Human chromosomes</p> <p>2) Nondisjunction and syndromes</p> <p>3) Twins</p> <p>4) Inborn errors of Metabolism</p> <p>5) Genes and cancer.</p> <p>6) Gene cloning</p> <p>7) Gene therapy.</p> <p>8) DNA Fingerprinting.</p>	20

4

Embryology:

- 1) Types of eggs in animals
- 2) Types of cleavages in the eggs of animals
- 3) **Study of development of chick embryo up to 72 hours.**
 - i) Egg of chick
 - ii) Fertilization and cleavages and development upto three germinal layers.
 - iii) The development of chick embryo at 24 Hrs, 48 hrs., and 72 hrs.
 - iv) Development of extra embryonic membranes in chick embryo.
 - v) Development of Brain, Heart and kidney in chick embryo.
- 4) Placenta and its types (Mammals)

20

SCC 305 Z-07 Zoology VII
Evolution, Animal Behavior, Wildlife Biology,

Unit No.	Content	Hours
1	Evolution A. Variation: 1. Types of variation 2. Causes of variation B. Isolation: 1. Mechanism of isolation 2. Types of isolation 3. Origin of isolation C. Modern Concept of Theory of Natural Selection	20
2	A. Animal Behaviour 1. Social behaviour 2. Courtship behaviour 3. Learning behaviour 4. Communication in animals B. Wild-Life Biology (Conservation & management) 1. Introduction to wild life a. What is wild life ? b. importance of Wild Life conservation c. Causes of depletion of wild life d. Classification of scarce wild life. e. Wild life protection Act 1972. f. Methods of wild life census g. Reintroduction of wild fauna h. Man-Animal Conflict - Elephants - Leopard. i. Status of wild life conservation in Gujarat	20
3	Fisheries Biology and Applied Entomology A. Fishery Biology 1. Pomt fret Fishery 2. Fish Culture in freshwater a. Induced breeding b. Management of pond. 3. Byproducts of Fish 4. Preservation and processing of fish B. Applied Entomology 1. Plant protection and appliances 2. Pest of sugarcane, paddy, oilseed crops, coconut palm, Mango leaf hopper, Banana weevil	20
4	Radiation and Mankind A. Types of Radiation B. Use of Radiation C. Hazards of Radiation	20

SCC 306 PRO Z-08 Zoology VIII		
Project Evolution		
1.	Internal (Assignments/Seminar/Visit of National Park/Sanctuary and its Repo Submission)	30
2.	External (Project, Viva and Report Submission)	70
Total		100 Marks

SFC301ENG-III

Total Marks: 100

University Exam: 70

Internal Assessment: 30

Total Hours: 90

Course Content:

Unit 1. Collection of Short Stories:

1. A Cup of Tea by Katherine Mansfield.
2. The Weed by Amrita Pritam.
3. A Devoted Son by Anita Desai.

Unit 2. Study of Poems:

1. Eternity by William Blake
2. Bright Star by John Keats
3. Beautiful Things by Ellen P. Allerton

Unit 3. Grammar:

1. Change the Sentence into Reported Speech.
2. Remove too and use too.
3. Use of 'As soon as', 'No Sooner....than', and 'Hardly/Scarcely....When'
4. Use of 'Though', 'Even if/Even Though', 'But', 'However', 'As' and 'In spite of'.
5. Use of 'If', 'If...not', 'Unless', 'Otherwise' and 'or'.
6. Use of Phrase Preposition:
('In order that', 'In order to', 'On account of', 'Because of', 'Owing to' and 'Due to')

Unit 4. Composition:

I. Biographical Sketch Writing.

(Note: Write a biographical sketch on any one of the character given in the paper. The following sketches are to be studied by the students)

1. Dr. A.P.J. Abdul Kalam.
2. P.V. Sindhu.
3. Sunita Williams.
4. Dr. B.R. Ambedkar.
5. R.K. Laxman.

Unit-5. Writing:

1. Application and C.V Writing
2. Precise Writing

Prescribed books:

1. *Practical English usage* by Michael Swan.
2. Raymond Murphy's *English Grammar in Use*.
3. *Twelve Short Stories* by C.S.Sharma.
4. *Contemporary English Grammar Structures and Composition* by David Green.

SPR 301 Practical Module- III

Practical - I (Based on paper No. Z 04 301) (Nonchordates)

Content

A. Classification of following animals upto order

Protozoa : Ceratium Noctiluca, Giardia, Eudorina, Trypanosoma, Opalina, Balantidium, Nyctotherus, Entamoeba, Arcella, Diffugia, Plasmodium, Monocystic, Foraminifera.

Perifera : Euptectella, Oscarella, Chalina, Gemules and spiculle, Leucosolenia, Cycon, Euspongia, Spongilla.

Coelenterata : Pennaria, Pennatula, Rhizostoma, Metridium, Fungia, Alcyonium, Baugain vellia, Zooanthus, Planularlarva.

Platyhelminthes : Planaria, Amphilina, Bipalium, Schistosoma, Liverfluke, Tapeworm, Polystoma.

Nemathelminthis : Ascarris, Dracunculus, (Guinea worm) Filaria, Loa microfilaria, Theradworm, Vermmicularia.3950

Annelida : Eurithroe, Chaetopterus, Amphitrite, Arenicola, Polynoe, Eunice, Terebella, Spirorbis, serpulla, Tubifix, Liumbricus, Megascolex, Alanthobdella, Branchillion, Pantobdella, Trochophore larva.

Arthropoda : Balanus, Sacclina, Apus, Cyclops, Daphnia, Mysis, Gammarus, Squilla, Hippa, Squilla, Scutigera, Limulus Argulus, Lepisme, Branchipus, Artemia, Hebalia, Caprella, Oniscus, Scolopendra, wolfspider Buthus, Alima larva, Megalopa larva

Mollusca : Patella, Doris, Onchidium, Pecten, Mutihrs, Solen, Nautilus, Pearl oyster, Ariophanta, Trochus, Murex, Terebra, Eolis, vaginulus, Pinna, Bulla, velligr larva.

Echinodermata : Echinus, Astropecten, As trophytoh, cucumaria, synapta, Echinocardium, Pripinaria larva, Pluteus larva.

(B) Study of following system by Chart / Models or Computer animation

(1) Grass-hopper

- (a) Study of external characters and digestive system.
- (b) Reproductive system.
- (c) Nervous system.
- (d) Mountings Mouth parts, spiracle

(2) Cockroach

- (a) Study of external characters and digestive systems,
- (b) Reproductive system.
- (c) Nervous system³
- (d) Mountings : Mouth parts, cornea, salivary gland, spiracles, gonapophysis

(3) Scorpion :

- (a) Study of external characters and digestive system.
- (b) Reproductive system
- (c) Circulatory system.
- (d) Mountings : Pecten, coaxal gland, Book lungs, poison gland with sting.

(4) Sepia

- (1) Study of external characters and digestive system.
- (2) Nervous system.
- (3) Mountings: Jaws, spermatophore, statocyst.

Practical – II (Based on paper No. Z-05 302)

Study of following organs / tissue of mentioned animals through Charts/ Permanent Slides/ computer Animation)

1. Shark – Ampulla of Lorenzine, Membranus labrinthre

Calotes – Pecten

2. Hyoid apparatus

Frog – Hyoid apparatus

Pigeon – types of feathers pecten

3. Histology of following

Mammalian organs by permanent slide/ Charts/ computer animation)

1. Pancreas

2. Liver

3. Kidney

4. Ovary

5. Testis

6. Adrenal gland

4. Dentition of mammals

Cow, Goat, Dog, Lion, Cat, Camel, Pig

5. Classification of following Animals up to order :

Protochordata and cyclostomata:

Ascidia, Botrylus, Herdmania, Oikapleura, Pyrosoma, Doliolum, Salpa, Amphioxus, Balanoglossus, Lamprey, Myxine, Amocoetus larva

Pisces: Pristis, Trygon, Torpedo, Raja, Chaimera, Lepidosteus, Polypterus, Protopterus, Anguilla, Hippocampus, Tetradon, Anabus, Hemiramphus, Mudskipper, Exocoetus, Echineis.

Amphibia: Salamander, Necturus, Siren, Hyla, Bufo, Ichthyophis, Axolotal larva

Reptiles : Pond Turtle, Starred tortois, Varanus, Draco, Hemidactylus, Chamaeleon, Uromastix, mabuiya, Cobra, Ratsnake, Echiscarinata, Typhlops, Sea snake, Krait, Rattle snake.

Aves : Parrot, House sparrow, crow, Spotted owl, hoopoe, Green bea eater, Gray babbler, Weaver bird, Quail, Vulture, Painted stork

Mammals: Rat, Rabbit, Guinea pig, Hedgehog, Jackal, squirrel, mangoose, shrew, Fox and Flying fox.

Practical – III (Based on paper Z-06 303, Paper Z07 304 and Evolution)

(A) Cytology

Tools and Techniques : Study through Charts/Equipment/Computer Animation

- 1) Electron microscope
- 2) Phase contrast Microscope
- 3) Paper chromatography
- 4) Centrifugation.
- 5) Electrophoresis

Genetics:

- (1) Staining of Bar body
- (2) Study of Karyotypes
- (3) Study mitosis and meiosis by permanent slides
- (4) Squash preparation of onion root tips.
- (5) Mounting of salivary gland chromosomes from chironomous larva.
- (6) Vital staining of mitochondria.
- (7) Study of cell organelles through charts
- (8) Isolation of DNA from tissue.
- (9) Isolation of RNA from yeast
- (10) SDS PAGE discontinuous Gel Electrophoresis

(B)Histology

Study of Histology of Endocrine glands of Mammals through Permanent Slides/Charts/Computer Animation

- 1) Pituitary gland, 2) Thyroid 3) Parathyroid 4) Adrenal gland, 5) Pancreas 6) Testis, 7) Ovary.
- 8) Liver 9) Kidney of Mammals.

(C) Biochemistry: Study of Carbohydrates Proteins and Lipids by Atomic Model/Charts/Computer Animation.

(D) Evolution: Study of Dinosaurs by models / Charts and Computer Animation

(E) Embryology: Study of Following through Chick Egg/Chart/Permanent Slides/ Computer Animation

- 1) Types of eggs in animals
- 2) Types of cleavages in the eggs of animals
- 3) **Study of development of chick embryo up to 72 hours.**
 - i) Egg of chick
 - ii) Fertilization and cleavages and development upto three germinal layers.
 - iii) The development of chick embryo at 24 Hrs, 48 hrs., and 72 hrs.
 - iv) Development of extra embryonic membranes in chick embryo.
 - v) Development of Brain, Heart and kidney in chick embryo.
- 4) Placenta and its types (Mammals)

Practical – IV Applied Zoology and embryology
(Practical based on paper – Z08 305 and submission work)

- (1) Identification and classification of following fishes upto family. pomfret, Rohu, Ophiocephalus, Shark, Sole fish.
- (2) Life cycle of prawn. (Larval only)
- (3) Techniques for preservation of fish
(by chart and models and computer animation)
- (4) Visit to marine and fresh water fishery centre.
- (5) Social organization of Honey bee by chart and computer animation.
- (6) Life History of Honey bee by charts and computer animation
- (7) Apparatus used in Apiculture by charts and computer / models
- (8) Life History of silk worm (by specimen and Study of cocoon)
- (9) Study of plant protection appliances by model by charts and computer
- (10) Pest of sugarcane, mango leaf-hopper and banana weevils by model, Charts and computer animation
- (11) Pest of oil seed crop and coconut palm by specimen charts and computer animation / models
- (12) Visit of a national park / sanctuary. Study of wild life and animal behaviour by visit of sanctuaries and National Park using tools (movie, still camera, Binoculars.)
- (13) Preparation of permanent slides :
by Microtomy and Whole mounts.
- (14) Tour and Excursion report.
- (15) Other submission work as prescribed in the syllabus.
- (16) Embryology :
 - (a) Study of chick embryology - whole mount from 16 to 72 hours incubation – by permanent slides.
 - (b) Study of transverse section of different stages of chick embryo by permanent slides.
 - (c) The study of Frog and Amphioxus embryology by permanent slide and charts / Computer animation

BIRSA MUNDA TRIBAL UNIVERSITY, RAJPIPLA
B.Sc. Zoology 3rd Year

Pattern of University Practical Exam
(Based on Paper 301 Z04 and Paper 302 Z05)

Time: 10:30am to 5:00pm (Including 30 minutes recess) Total Marks: 100

(A) Attempt given Practical as per Professor Instructions (25 marks)

- Any Two exercise should be selected for each candidate from syllabus.

(B) Attempt given practical as per Professor Instructions (25 marks)

- Any Two exercise should be selected for each candidate from syllabus.

(C) Attempt given Practical as per Professor's Instructions (10 Marks)

Any one exercise should be selected for each candidate from syllabus.

b) Rotation (15 Marks)

- Identify and describe given Specimens/ Charts/ Permanent Slides in given limited time
(5 min per Specimen)

(D) Viva-Voce and Journal

- **Viva-Voce on practical base (10 marks)**
 - **Journal (15 marks)**
 - **Note: Certified practical journal is compulsory for practical exam.**
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BIRSA MUNDA TRIBAL UNIVERSITY, RAJPIPLA

B.Sc. Zoology 3rd Year

**Pattern of University Practical Exam
(Based on Paper 303 Z06, Paper 304 Z07 and Paper 305 Z08)**

Time: 10:30am to 5:00pm (Including 30 minutes recess) Total Marks: 100

(E) Attempt given Practical as per Professor Instructions (25 marks)

- Any Two exercise should be selected for each candidate from syllabus.

(F) Attempt given practical as per Professor Instructions (25 marks)

- Any Two exercise should be selected for each candidate from syllabus.

(G)) Attempt given Practical as per Professor's Instructions (10 Marks)

Any one exercise should be selected for each candidate from syllabus.

b) Rotation (15 Marks)

- Identify and describe given Specimens/ Charts/ Permanent Slides in given limited time
(5 min per Specimen)

(H) Viva-Voce and Journal

- **Viva-Voce on practical base (10 marks)**

- **Journal (15 marks)**

➤ **Note: Certified practical journal is compulsory for practical exam.**
