Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]

Kannada Linguistic Minority Institute
NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

Academic Council 1(6)
2nd July, 2020

UG Science Programme: B.Sc.-I To be implemented from A.Y. 2020-2021

System: Choice Based Credit System (CBCS) with SGPA and CGPA

Programme: ZOOLOGY

Structure and Examination for: Discipline Specific Core Courses(DSC-A and DSC-B)

Table-1

Semester	Course		Teaching Scheme/week			
			Course Code	Hours	Lectures	Credits
I	DSC-A	Theory-I:ANIMAL DIVERSITY- I	2031114	4	5	4
		Theory-II: ANIMAL DIVERSITY- II	2031115			
		Practical-I: Zoology Practical	2031226	3.2	4	2
II	DSC-B	Theory-I: COMPARATIVE ANATOMY OF VERTEBRATES	2031214	4	5	4
		Theory-II: DEVELOPMENTAL BIOLOGY OF VERTEBRATES	2031215			
		Practical-I: Zoology Practical	2031226	3.2	4	2

Table-2

Semester	Course		EXAMINATION Marks			Credits
			CA	SEE	Total	
I	DSC-A	Theory-I:ANIMAL DIVERSITY- I	15	35	50	4

		Theory-II: ANIMAL DIVERSITY- II	15	35	50	
II	DSC-B	Theory-I: COMPARATIVE ANATOMY OF VERTEBRATES	15	35	50	4
		Theory-II: DEVELOPMENTAL BIOLOGY OF VERTEBRATES	15	35	50	
	DSC-A & DSC-B	Practical-I: Zoology Practical	30	70	100	4

CA: Continuous Assessment SEE: Semester End Examination

Note: -

The above structure (Table-1 and Table-2) is for Sem-I and Sem-II of the undergraduate B.Sc.-I * /B.S.Ecs.-I /B.C.A.-I programmes under science faculty.

* B.Sc.-I Select any four DSC form Chemistry /Physics /Mathematics /Statistics /Electronics /Botany /Zoology /Geography /Psychology.

DSC: Discipline Specific Core Course AECC: Ability Enhancement Compulsory Course

Passing in each course is compulsory including Democracy. course.

SGPA/CGPA and Total Marks will be calculated excluding AECC and Democracy. courses.

Compulsory Course:

DEMOCRACY	2000232	DEMOCRACY ELECTIONS AND GOVERNANCE
PHY EDU	2000233	PHYSICAL EDUCATION

Syllabus for: Discipline Specific Core Courses (DSC-A and DSC-B)

SEM-I

Academic Council 1(6) **2nd July, 2020** **DSC-A Theory-I Paper-ITitle:ANIMAL DIVERSITY- I** **ZOOLOGY-I(2031114)** **(50 Marks and 2 credits)**	**Hours30**

Unit1	**Kingdom Protista** General characters and classification up to classes; locomotory organelle and locomotion in protozoa ,**Economic importance of protozoa**	3
Unit2	**Phylum Porifera** General characters and classification up to classes; canal system in *Sycon*	3
Unit3	**Phylum Cnidaria** General characters and classification up to classes; polymorphism in hydrozoa.	3
Unit4	**Phylum Platyhelminthes** General characters and classification up to classes; life history of *Taenia solium*	3
Unit5	**Phylum Nemathelminthes** General characters and classification up to classes; life history of *Ascaris lumbricoides* and it's parasitic adaptations	3
Unit6	**Phylum Annelida** General characters and classification up to classes; metamerism in annelid, economic importance of annelids with reference to earthworm and leech	4
Unit7	**Phylum Arthropoda** General characters and classification up to classes; metamorphosis in insects, economic importance of insects. **Insect control i) Chemical control ii) Biological controlat least one example from each class.**	4
Unit8	**Phylum Mollusca** General characters and classification up to classes; economic importance of molluscs, Mechanism of pearl formation.	3
Unit9	**Phylum Echinodermata** General characters and classification up to classes; water vascular system in *Asteroidearuben*	4

PROGRAM OUTCOMES OF B.Sc. PROGRAM

PO1 Acquire skill, training and knowledge to enhance thinking, comprehension and application abilities to compete, succeed and excel globally.
PO2 Gain knowledge and experience (through theory, experiments, tutorials, projects and industrial / field visits), to achieve ultimate progress and improvement, to be capable of employment and meet the global competencies.
PO3 Identify, formulate and analyze problems. Create, select, and apply suitable techniques, resources, and modern scientific tools to accomplish verified conclusions with an understanding of the limitations.
PO4 Apply moral principles and commit to the norms of scientific practice in every endeavor. Validate expertise to conduct wide range of scientific experiments to solve problems.
PO5 Communicate efficiently scientific events with the Scientific community and with Society at large with capability to comprehend and pen operative reports and design documentation, make effective presentations, and give and receive clear instructions.
PO6 Reveal knowledge with thoughtful expression of the scientific principles in one's own work, as an individual member and capable leader in a team, to manage projects in multidisciplinary environments.

Course Outcome:Student is able to
PSO:1 Apply the invertebrate animals and vertebrates animals in society.

PSO2: Apply the Zoology Knowledge in problem solving in society.
PSO3: To acquire skills in the observation and study of nature and behavior of animals..
PSO4: To acquire skills in the experimental skillsand biological techniques**.**
PSO 5: To impart awareness about conservation of animals .

Course Outcome	**Blooms Taxonomy Level**
CO 1: Describe general taxonomic rules on animal classification	Understand
CO 2: Classify Protista up to phylum using examples from parasitic adaptation	Understand
CO 3:Classify Phylum Porifera to Echinodermata with taxonomic keys	Understand
CO 4: Interpret use of different animals from phylum Protista to phylum Echinodermata.	Apply

Academic Council 1(6) **2nd July, 2020** **DSC-A Theory-IIPaper-II Title: ANIMAL DIVERSITY II** **ZOOLOGY-II(2031115)** **(50 Marks and 2 credits)**		**Hours 30**
Unit 1	**Protochordates** General features and phylogeny of protochordata	3
Unit 2	**Agnatha** General features of agnatha and classification of cyclostomes up to classes	3
Unit 3	**Pisces** General features and classification up to orders; economic importance of fishes**- Indian major carps from fresh water fishes**	4
Unit 4	**Amphibia** General features and classification up to orders; parental care in Amphibia	5
Unit 5	**Reptiles** General features and classification up to orders; poisonous and non-poisonous snakes, snake venom, symptoms and treatments of snake bite.	5
Unit 6	**Aves** General features and classification up to orders; flight adaptations in birds, **Migration in birds.**	5
Unit 7	**Mammals** General features and classification up to orders; adaptive radiation in mammals **according to habit and habitat**	5

Course Outcome: Student will be able to	
Course Outcome	**Blooms Taxonomy Level**
CO 1: Identify the poisonous and non-poisonous snakes.	Understand
CO2: Examine the symptoms of snake bite.	Analyze
CO 3: Describe snake venom and treatment of snake bite.	Understand
CO 4: Identify and classify different birds and describe migration and flight adaptation in birds.	Understand

SEM-II

Academic Council 1(6) **2nd July, 2020** **DSC-B Theory-I Paper-III** **ZOOLOGY-III(2031214)** **Title: COMPARATIVE ANATOMY OF VERTEBRATES** **(50 Marks and 2 credits)**		**Hours** **30**
Unit 1	**Integumentary System** Derivatives of integument with reference to glands and digital tips	4
Unit 2:	**Skeletal System** Appendicular (Pectoral and pelvic girdle.) and axial (Typical vertebra) skeleton in vertebrates.	4
Unit 3	**Digestive System** Brief account of alimentary canal and digestive glands.	5
Unit 4:	**Respiratory System** Brief account of skin, gills, lungs, air sacs and swim bladder	5
Unit 5:	**Circulatory System** Evolution of heart and aortic arches	4
Unit 6	**Urinogenital System** Succession of kidney, Evolution of urinogenital ducts	4
Unit 7:	**Nervous System** Comparative account of brain	4

Course Outcome: After successfully completing this course, the students will be able to:

Course Outcome	Blooms Taxonomy Level
CO1:Compare the different systems of animals,	Analyze
CO2 : Explain evolution of respiratory organs of vertebrates.	Understand
CO 3: Explain the comparative difference of all systems including digestive ,respiratory , circulatory and excretory and nervous from different classes of vertebrates.	Understand
CO4: Interpret the evolution of vertebrates.	Apply

Academic Council 1(6) **2nd July, 2020** **DSC-B Theory-IIPaper-IV** **Title:DEVELOPMENTAL BIOLOGY OFVERTEBRATES** **ZOOLOGY-IV(2031215)** **(50 Marks and 2 credits)**		**Hours** **30**
Unit1	**Gametogenesis:** (a) Spermatogenesis and oogenesis with reference to mammals (b) Vitellogenesis in birds and structure of hen's egg	3
Unit2	**Fertilization** (a) External fertilization in amphibians (b) General mechanism of fertilization in mammals	3

Unit3	**Early Embryonic Development up to Gastrulation** (a) Cleavage, blastulation and gastrulation in frog (b) Cleavage, blastulation and gastrulation in human (c) Fate map of blastula in frog and human	5
Unit4	**Placenta in mammal** (a) Implantation of blastocyst in humans, human placenta and functions (b) Types of placenta on the basis of histology	4
Unit5	**Development and it's Regulation** (a) Cellular differentiation: Definition, mechanism of differentiation (b) Cellular movements: Epiboly, emboly and it's significance in development (c) Apoptosis: Definition, general mechanism and significance	5
Unit6	**General Topics in Embryology** (a) Metamorphosis in frog tadpole and it's hormonal regulation (b) Types of twins in human (c) Parental care in mammals	5
Unit7	**Recent Developments in Human Embryology** (a) Principles and applications of ultrasound (b) Causes of miscarriages	5

Course Outcome:

Course Outcome	**Blooms Taxonomy Level**
CO 1: Define the term gametogenesis and spermatogenesis and oogenesis.	Remember
CO 2: Explain the process of spermatogenesis and oogenesis.	Understand
CO 3: Compare the different embryonic developmental stages of different classes vertebrate animals.	Analyze
CO 4:Criticise on types of twins.	Analyze
CO 5: Illustrate the external and internal fertilization.	Apply

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DSC-A&DSC-B

ZOOLOGY PRACTICAL-I (2031226)

(100 Marks and 4 credits)

	CA : Continuous Assessment - 30 **Total : (30+70) 100** SEE: Semester End Examination --70
	TITLE
1	**Study of the following specimens (General characters and classification)CD/Model/Chart/Slides/Virtual** • *Amoeba, Euglena, Plasmodium, Paramecium* • *Sycon, Hyalonema, and Euplectella* • *Obelia, Physalia, Aurelia, Metridium* • *Taenia,, Ascaris, Fasciola* • *Aphrodite, Nereis, Pheretima, Hirudinaria* • *Peripatus, Palaemon, Crab, Limulus, Scolopendra, Julus, Periplaneta* • *Chiton, Dentalium, Pila, Unio, Sepia, Octopus* • *Pentaceros, Ophiura, Echinus, Cucumaria and Antedon*, • *Balanoglossus, Herdmania, Branchiostoma* • *Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla* • *Ichthyophis, Salamandra, Bufo, Hyla* • *Chelone,Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Crocodylus, Gavialis* • **Any six common birds from different orders:**

	• *Ornithorhynchus*, *Pteropus*, *Rattus*, *Loris, Funambulus*
2	**Study of the following permanent slides/lab.specimens:** (a) T.S. and L.S. of *Sycon*, (b) *Taenia*- Scolex, mature & gravid proglottid (c) Whole mount of male and female *Ascaris* and Liverfluke (d) Observation and identification of protozoans, helminthes, arthropod vectors **Parasitic protozoans –Trypanosoma,Entamoeba and Giardia.**
3	**Key for Identification of poisonous and non-poisonous snakes:** Cobra & Rat Snake (An "**animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.)
4	**Osteology**: **CD/Model/Chart/Slides/Virtual CD** **a)Disarticulated skeleton of frog:** Skull, Atlas, Typical Vertebra, Pectoral and Pelvic Girdle **b) Study of mammalian skulls:** One herbivorous (**Sheep)**and one carnivorous animal**(Dog)**
5	**Frog -** Study of developmental stages - whole mounts and sections through permanent slides – cleavage, Blastula, gastrula, tadpole external and internal gill stages. **(CD/Model/Chart/Slides/Virtual CD)**
6	**Chick Embryology:** Study of chick egg and W.M. of embryonic stages: 18 hrs and 24 hrs.
7	**Placenta:** Study of the different types of mammalian **placenta**-histological sections using permanent slides or Intact placenta of Rat / Human using laboratory material / photomicrographs. **CD/Model/Chart/Slides/Virtual CD**
8	Examination of **gametes** - frog/rat - sperm and ova through permanent slides or photomicrographs./ **CD/Model/Chart/Slides/Virtual CD**
9	**Cytological Preparation:** (a) Stained preparation of mitochondria using vital staining with suitable material (b) Stained preparation of nucleus in blood smear using Leishman's stain (c) Study of Osmosis: Effect of Isotonic, hypotonic and hypertonic solution on blood cells
10	**Study Tour /** – Visit to any suitable place of Zoological interest to study animal biodiversity / IVF and hospital Facility / Research Centre and submission of report. **All necessary precautions must be taken while organizing Study tour with reference to the safety of students.** **(Or)** A small project report or review article submission of any one topic related to any Ecological and Applied Zoological interest.

Teaching-Learning Equipment's/Tools/Methods/etc.:

1) ICT
2) Books
3) Charts
4) Models
5) Specimens
6) Lab equipment's

List of Books:

	Title	Authors	Publisher
1	*Invertebrate Zoology*, VIII Edition	Ruppert and Barnes, R.D	(2006) Holt Saunders
2	*The Invertebrates: A New Synthesis*	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I.	III Edition, Blackwell Science
3	*The Life of Vertebrates*.	Young, J. Z.	III Edition. Oxford university press.
4	*Vertebrate life,*	Pough H.	Edition, Pearson International.
5	*Strickberger's Evolution*.	Hall B.K. and Hallgrimsson B	Jones and Bartlett Publishers Inc.
7	*Vertebrates' Comparative Anatomy, Function and Evolution*. IV	Kardong, K.V.	McGraw-Hill Higher Education.
8	*Comparative Anatomy of the Vertebrates*.	Kent, G.C. and Carr R.K.	The McGraw-Hill Companies.
9	*Analysis of Vertebrate Structure*,	Hilderbrand, M and Gaslow G.E.	John Wiley and Sons.
10	*Biology of Vertebrates*,	Walter, H.E. and Sayles, L.P	Khosla Publishing House.
11	Developmental Biology	Gilbert, S. F.	VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
12	An introduction to Embryology	Balinsky, B.I.	International Thomson Computer Press.

13	Patten's Foundations of Embryology	Carlson, Bruce M	McGraw Hill, Inc.

Chairman
BOS in Zoology