AC ITEM NO.: AC/MAR-22/3-ZOO

Celebrating 63 Years of Glory

Parle Tilak Vidyalaya Association's

SATHAYE COLLEGE (AUTONOMOUS)

NAAC accredited 'A' Grade (3rd Cycle)

Dixit Road, Vile Parle (E), Mumbai-57

Affiliated to

University of Mumbai

SYLLABUS FOR
F. Y. B. Sc. (ZOOLOGY)

As per **C**hoice **B**ased **C**redit **S**ystem pattern of UGC
To be implemented from Academic Year: 2022-2023

PREAMBLE:

While presenting this syllabus to the teachers and students of Semester I and Semester II (F.Y.B.Sc.) Zoology, I am extremely happy to state that for the first time efforts have been made to seek inputs of all the stake holders to make it more relevant.

In the first meeting of the Board of Studies an apex committee was formed to study syllabi worldwide with a view to include modern modules and plan semesters at UG and PG programs in advance to avoid overlapping and duplication of topics in various courses.

Meeting with the industry at the Indian Merchants' Chamber and with the meritorious alumni helped adding need based components. For the first time students were a part of the syllabus committee and the process became participative when the draft was finalized in an open meeting with all the Zoology teachers after having sought democratic criticism on the proposed syllabus.

While following the guidelines of UGC, use of animals is excluded from the practicals, substituting the same with audio-visual, ICT and simulation aids and that the syllabus is made more interesting with new, innovative topics. Providing the pedagogy as also indicating objectives and desired outcome of every topic for the teachers, and question bank for the students apart from the question paper pattern became an integral part of the syllabus, therefore.

Care is taken to provide the drafts from time to time and declare the final syllabus well in advance enabling the teachers to make preparations before commencement of the academic year and facilitating students to execute their right to know the details before admissions.

The success of this revamped syllabus will depend totally on the enthusiasm of the teachers which is very high all throughout the process and their hands will be strengthened by publishing the text books for the first time. This curriculum of the Zoologists, for the Zoologists and by the Zoologists developed with the united efforts will take our ever progressive subject to greater heights in the years to come.

OBJECTIVES:

1. To orient the students about ecosystem, bio-diversity, wildlife conservation and management with the help of models, photographs, movies, documentaries, charts and use of ICT and then take learners to field to have realistic experiences.
2. To obtain knowledge in wildlife and can choose Wildlife Tourism as a career.
3. To identify socio-economic animals & it’s beneficial to humans.

4. To understand importance of co-existence and conservation of bio-diversity and create awareness about wildlife protection.
5. To identify various potential risk factors to health of humans.
6. To explain the role and impact of different environmental conservation programmes.
7. To acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation.

STRUCTURE OF THE COURSE:

The Board of Studies in Zoology in its meeting held on 2nd March 2022 has discussed, finalized and unanimously accepted the revised syllabus (as per CBCS pattern) prepared by committee. The titles of the papers for F.Y.B.Sc. (Zoology) areas given below;

SEMESTER – I

COURSE CODE	COURSE NAME	UNIT	TOPICS	CREDITS	NO. OF LECTURES
UGSC1ZOO0122	**Biodiversity and Entomology**	1	Wonders of Animal World	**2**	**45**
		2	Biodiversity and Its Conservation		
		3	Entomology		
UGSC1ZOO0222	**Instrumentation and Biotechnology**	1	Laboratory safety, Units and Measurement	**2**	**45**
		2	Animal Biotechnology		
		3	Instrumentation		
UGSC1ZOOP122	**Practical course I**	Practical based on Paper I and Paper II		**2**	**90**

SEMESTER – II

COURSE CODE	COURSE NAME	UNIT	TOPICS	CREDITS	NO. OF LECTURES
UGSC2ZOO0122	**Ecology**	1	Population ecology	**2**	**45**
		2	Ecosystem		
		3	National parks and Sanctuaries of India		
UGSC2ZOO0222	**Human Health and Diseases**	1	Nutrition and Health	**2**	**45**
		2	Public Health and Hygiene		
		3	Common Human Diseases and Disorders		
UGSC2ZOOP122	**Practical course II**	Practical based on Paper I and Paper II		**2**	**90**

Semester I
Zoology Paper I
UGSC1ZOO0122 (Course 1)
Biodiversity and Entomology

COURSE OBJECTIVES:

1. To take learners through a captivating journey of hoarded wealth of marvellous animal world.
2. To orient learners about rich heritage of Biodiversity of India and make them understand significance of its conservation.
3. To introduce learners to the world of insects

COURSE OUTCOMES:

1. Curiosity will be ignited in the mind of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology.
2. Learners would appreciate treasure of Biodiversity, its importance and hence would contribute their best for its conservation.
3. Learners will be able to have basic understanding about the structure of insects. This unit will enhance the interest of leaners in the Zoology subject as a whole.

COURSE CONTENTS:

Unit	Description	Lectures
I	**WONDERS OF ANIMAL WORLD** 1.1: Echolocation in Bats and Cetaceans - Dolphins and Whales 1.2: Mechanism of Pearl formation in Mollusca 1.3: Bioluminescence in Animals: Noctiluca, Glow worm, Firefly, Angler Fish (Mechanism and use for the animal) 1.4: Regeneration in Animals - Earthworm (Annelida) and Lizard (Reptile) 1.5: Mimicry in Butterflies and its significance: Great Eggfly and Common Crow, Common Palmfly and Plain Tiger. 1.6: Mechanism of Coral formation and types of Coral reefs	**15**

	1.7: Bird migration: Definition, types and factors inducing bird migration 1.8: Adaptive features of desert animals: Reptiles (Phrynosoma) and Mammals (Camel) 1.9: Breeding and Parental care in: 1.9.1: Pisces - Ovo-viviparous (Black Molly/Guppy), Mouth brooders (Tilapia), Brood pouches (Sea horse) 1.9.2: Amphibia - Mouth brooders (Darwin's Frog), Egg carriers (Midwife Toad) 1.9.3: Aves: Brood Parasitism (Cuckoo)	
II	**BIODIVERSITY AND ITS CONSERVATION** 2.1: Introduction to Biodiversity - Definition, Concepts, Scope and Significance 2.2: Levels of Biodiversity - Introduction to Genetic, Species and Ecosystem Biodiversity 2.3: Introduction of Biodiversity Hotspots- (Western Ghats and Indo-Burma Border) 2.4: Values of biodiversity - Direct and Indirect use value 2.5: Threats to Biodiversity - Habitat loss and Man-Wildlife conflict 2.6: Biodiversity conservation and management 2.6.1. Conservation strategies: *in situ,* ex-situ, National parks, Sanctuaries and Biosphere reserves. 2.6.2. Introduction to International efforts : Convention on Biological Diversity (CBD), International Union for Conservation of Nature and Natural Resources (IUCN), United Nations Environment Program - World Conservation Monitoring Centre (UNEP-WCMC) 2.6.3. National Biodiversity Action Plan, 2002 2.6.4. Introduction to Indian Wildlife (Protection) Act, 1972 and Convention for International Trade of endangered species	**15**

III	**ENTOMOLOGY** 3.1: Introduction to entomology- Origin and Evolution, Characters 3.2: Economic importance of entomology- Useful and harmful insects. 3.3: Forensic entomology 3.4: Nutritional entomology 3.5: Integrated Pest Management (IPM) 3.6: Insect Development- Complete, gradual, incomplete, and no metamorphosis. 3.7: Slave-making ants (*Polyergus lucidus)* 3.8: Bombardier beetle (*Brachinus species*) 3.9: Other creatures like Insect- Spiders, Spider Mites, Ticks, and Scorpions – (Class Chelicerata). 3.10: Common names associated with insect order 3.11: Medical and veterinary Entomology	15
	Total	**45**

Semester I
Zoology Paper II
UGSC1ZOO0222 (Course 2)
Instrumentation and Biotechnology

COURSE OBJECTIVES:

1. To make learners aware of risks involved in handling of different hazardous chemicals, sensitive (electrical/electronic) instruments and infectious biological specimens especially during practical sessions in the laboratory and to train them to avoid mishap.
2. To acquaint learners to the modern developments and concepts of Zoology highlighting their applications aiming for the benefit of human being.
3. To provide all learners a complete insight about the structure and train them with operational skills of different instruments required in Zoology.

COURSE OUTCOMES:

1. Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and economy in use of materials/chemicals during practical sessions.

2. Learners would understand recent advances in the subject and their applications for the betterment of mankind; and that the young minds would be tuned to think out of the box.
3. Students will be skilled to select and operate suitable instruments for the studies of different components of Zoology of this course and also of higher classes including research.

COURSE CONTENT:

Unit	Description	Lectures
I	**Unit 1: Laboratory safety, Units and Measurement** 1.1: Introduction to good laboratory practices 1.2: Use of safety symbols: meaning, types of hazards and precautions 1.3: Units of measurement: 1.3.1: Calculations and related conversions of each: Metric system- length (meter to micrometer); weight (gram to microgram), Volumetric (Cubic measures) 1.3.2: Temperature: Celsius, Fahrenheit, Kelvin 1.3.3: Concentrations: Percent solutions, ppt, ppm, ppb dilutions, Normality, Molarity and Molality. 1.3.4: Biostatistics: Introduction and scope, Sampling and its types, Central Tendencies (mean, median, mode) Tabulation, Graphical representations (Histograms, bar diagrams, pie diagrams).	**15**
II	**Animal Biotechnology** 2.1: Biotechnology: Scope and achievements of Biotechnology (Fishery, Animal Husbandry, Medical, Industrial) 2.1.1: DNA fingerprinting: Technique in brief and its application in forensic science (Crime Investigation) 2.1.2: Recombinant DNA in medicines (recombinant insulin) 2.1.3: Gene therapy: Ex-vivo and *In vivo,* Severe Combined Immunodeficiency (SCID), Cystic Fibrosis	**15**

	2.1.4: Green genes: Green Fluorescent Protein (GFP) from Jelly fish-valuable as reporter genes used to detect food poisoning. 2.2: Transgenesis: Retro viral method, Nuclear transplantation method, DNA microinjection method and Embryonic stem cell method 2.3: Cloning (Dolly) 2.4: Ethical issues of transgenic and cloned animals 2.5: Applications of Biotechnology:	
III	**Instrumentation** 3.1: Microscopy 3.1.1: Construction, principle and applications of dissecting and compound microscope. 3.2: Colorimetry and Spectroscopy - Principle and applications. 3.3: pH - Sorenson's pH scale, pH meter - principle and applications. 3.4: Centrifuge - Principle and applications (clinical and ultracentrifuges). 3.5: Chromatography - Principle and applications (Partition and Adsorption) 3.6: Electrophoresis - Principle and applications (AGE and PAGE)	**15**
	Total	**45**

SEMESTER I

Practical Course I-A

Practical UGSC1ZOOP122

(Based on Biodiversity and Entomology)

1. Mounting of foraminiferan shells from sand. (any 3)
2. Study of types of Corals - Brain, Organ pipe, Stag Horn, Mushroom coral.
3. Study of the following;
   a. Symbiosis (Termite and Trychonympha, Hermit crab and Sea anemone).
   b. Camouflage (leaf insect, Chameleon).
   c. Cannibalistic mate-eating animals (Spider and Praying Mantis).
   d. Animal architects: Termites, Harvester ant and Baya weaver bird.
   e. Study of bioluminescent organisms – Noctiluca, glow worm, fire fly, angler fish.
4. Breeding and parental care in Amphibia- *Rhacophorus*, Midwife toad, Darwin's frog, Caecilian.
5. Mounting of scales of fish (Placoid, Cycloid and Ctenoid)
6. a) Study of Adaptive radiation in Reptiles - Turtle, Tortoise, *Phrynosoma*, *Draco*)
   b) Identification and differentiation of venomous and non-venomous snakes (Scales, Fangs, Bite marks, etc.)
7. Study of Types of feathers- (contour, filoplume, down), beaks (Nectar feeding , Insect catching, Fruit eating, Scavenging, Filter feeding), claws (perching, wading, swimming, hopping) in birds.
8. a) Identification of birds - Coppersmith Barbet, Bulbul, Rose ringed Parakeet, Magpie Robin, two local birds.
   b) Field Report – To be done in a group of ten students (submission of written / typed report preferably along with photographs/ tables/ graphs.
9. Types of insect legs- Cursorial (running), Fossorial (digging), Saltatorial (jumping), Raptorial (catching and holding), Natatorial (swimming).
10. Types of insect wings- Scaly— flattened scales with hair, Elytra — hard protective cover wings, Hemelytra — half leathery and half membraneous, Membranous — transparent, Tegmina — leathery, Halteres — club-like.
11. Types of insect antennae- Geniculate (elbowed), Plumose (feathery), Pectinate (comb-like), Serrate (saw-toothed), Clavate (gradual club), Filiform (thread-like), Aristate (bristle-like), Setaceous (bristle-like), Moniliform (bead-like), Lamellate (finger-like), Capitate (clubbed).

12. Types of insect mouthparts-Siphoning, Sponging, Chewing-Lapping, Piercing-Sucking, Chewing.

    Other Suggested topics for field observation/survey:

    - Butterflies/ Fishes/ Migratory birds of local area.

    - Variations in Human like Attached vs. Free Earlobes, Blood Groups, Eye colour, etc. using statistical method.

13. Observations of fauna in the field (with reference to theory syllabus).

***Note - The practicals may be conducted by using specimens authorised by the wild such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended the UGC and as envisaged in the regulations of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals m here-in-above.**

#There shall be at least one excursion/field trip

SEMESTER I

Practical Course I-B

Practical UGSC1ZOOP122

(Based on Instrumentation and Biotechnology)

1. a) Interpretation of safety symbols (toxic, corrosive, explosive, flammable, skin irritant, oxidizing, compressed gases, aspiration hazards and Biohazardous fectious material.).
   b) Study of Central tendencies and plotting of Bar diagram, histogram and pie diagram.
2. Identification of transgenic fish (Trout and Salmon) / cloned animals (Dolly sheep, cc cat and Snuppy dog) from photograph.
3. Extraction of fruit juice with pectinase from apple/guava/or any other suitable fruit.
4. Calculation of pH of three different samples (one each acidic, alkaline and neutral) using pH paper/Universal Indicator and confirming the result with pH meter.
5. Application of DNA Fingerprinting in criminology (photograph of electrophoretic pattern to be given for interpretation by the students).
6. a) Study of parts of microscope and their functions.
   b) Technique of focussing a permanent slide under 10x and 45x (objectives).
7. a) Dilution of given sample and estimation of OD by using colorimeter.

b) Calculation of concentration from the given OD using formula.

8. Calculation of pH of three different samples (one each acidic, alkaline and neutral) using pH paper/universal indicator/pH indicator from red cabbage and confirming the result with pH meter.
9. a) Separation of amino acids from the mixture by paper chromatography.
   b) Calculation of Rf value of separated pigments/amino acids from given chromatogram and their identification from standard chart.
10. a) Separation of pigments by adsorption chromatography using chalk.
    b) Separation of lipids by TLC.

***Note - The practicals may be conducted by using specimens authorised by the wildlife and such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended by the UGC and as envisaged in the regulations of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals mentioned here-in-above.**

SYLLABUS FOR SEMESTER-II

SEMESTER II

ZOOLOGY PAPER I

UGSC2ZOO0122 (Course: 1)

Ecology

COURSE OBJECTIVES:

1. To facilitate the learning of population ecology, its dynamics and regulatory factors important for its sustenance.
2. This unit would allow learners to study about nature of animal population, specific factors affecting its growth and its impact on the population of other life form.
3. To impart knowledge of different components of ecosystem and educate about essentials of coexistence of human beings with all other living organisms.
4. To enlighten learners about the current status of wild life conservation in India in the light of guidelines from different relevant governing agencies vis-à-vis with adversity of poaching and biopiracy.

COURSE OUTCOMES:

1. This unit would allow learners to study about nature of animal population, specific factors affecting its growth and its impact on the population of other life form.
2. Learners will grasp the concept of interdependence and interaction of physical, chemical and biological factors in the environment and will lead to better understanding about implications of loss of fauna specifically on human being, erupting spur of desire for conservation of all flora and fauna.
3. Learners would be inspired to choose career options in the field of wild life conservation, research, photography and ecotourism.

COURSE CONTENT:

Unit	Description	Periods
I	**Unit 1: Population ecology:** 1.1: Population dynamics 1.1.1: Population density 1.1.2: Natality 1.1.3: Mortality	**15**

	1.1.4: Fecundity 1.1.5: Age structure 1.1.6: Sex ratio 1.1.7: Life tables 1.1.8: Survivorship curves 1.1.9: Population dispersal and distribution patterns 1.1.10: Niche concept 1.2: **Population growth regulation** 1.2.1: Intrinsic mechanism – Density dependent fluctuations and oscillations 1.2.2: Extrinsic mechanism- Density independent, environmental and climate factors, population interactions 1.3: **Population growth pattern** 1.3.1: Sigmoid 1.3.2: J Shaped 1.3.3: Human census (India) – Concept, mechanism and significance	
II	**Unit 2: Ecosystem:** 2.1: **Concept of Ecosystems** 2.1.1: Ecosystem - Definition and components 2.1.2: Impact of temperature on biota 2.1.3: Biogeochemical cycles (Water, Oxygen, Nitrogen, Sulphur) 2.1.4: Fresh water ecosystem – Lentic and Lotic 2.1.5: Food chain and food web in ecosystem (Fresh water and Grass land). 2.1.6: Ecological pyramids - energy, biomass and number. 2.1.7: Animal interactions (commensalism, mutualism, predation, antibiosis, parasitism)	**15**

III	**National parks and Sanctuaries of India** 3.1: Concept of Endangered and Critically Endangered species using examples of Indian Wildlife with respect to National Parks and Wildlife Sanctuaries of India (Sanjay Gandhi National Park, Tadoba Tiger Reserve, Corbett National Park, Kaziranga National Park, Gir National Park, Silent Valley, Pirotan Island Marine Park, Keoladeo Ghana National Park, Bandipur Sanctuary) 3.2: Management strategies with special reference to Tiger and Rhinoceros in India 3.3: Ecotourism 3.4: Biopiracy	**15**
	Total	**45**

SEMESTER-II

Zoology Paper 2

UGSC2ZOO0222 (Course: 2)

Human Health and Diseases

COURSE OBJECTIVES:

1. To make learners understand the importance of balanced diet and essential nutrients of food at different stages of life.
2. To impart knowledge about source, quantum and need for conservation of fast depleting water resource and essentials of maintaining proper sanitation, hygiene and optimizing use of electronic gadgets.
3. To educate learners about causes, symptoms and impact of stress related disorders and infectious diseases.

COURSE OUTCOMES:

1. Healthy dietary habits would be inculcated in the life style of learners in order to prevent risk of developing health hazards in younger generation due to faulty eating habits.
2. Promoting optimum conservation of water, encouragement for maintaining adequate personal hygiene, optimum use of electronic gadgets, avoiding addiction, thus facilitating achievement of the goal of healthy young India in true sense.

3. Learners will be able to promptly recognize stress related problems at initial stages and would be able to adopt relevant solutions which would lead to psychologically strong mind set promoting positive attitude important for academics and would be able to acquire knowledge of cause, symptoms and precautions of infectious diseases.

COURSE CONTENT:

Unit	Description	Lectures
I	**Unit 1: Nutrition and Health** 1.1: Concept of balanced diet, dietary recommendations to a normal adult, infant, pregnant woman and aged. 1.2: Malnutrition disorders – Anemia (B_{12} and Iron deficiency), Rickets, Marasmus, Goiter, Kwashiorkar (cause, symptoms, precaution and remedy). 1.3: Constipation, piles, starvation, acidity, flatulence, peptic ulcers (cause, symptoms, precaution and remedy). 1.4: Obesity (Definition and consequences). 1.5: Importance of fibres in food. 1.6: Significance of breast feeding. 1.7: Swine flu (cause, symptoms, precaution and remedy), Dengue (cause, symptoms, precaution and remedy). BMI calculation and its significance.	**15**
II	**Unit 2: Public Health and Hygiene** 2.1: **Health** 2.1.1: Definition of Health, the need for health education and health goal. 2.1.2: Physical, psychological and Social health issues. 2.1.3: WHO and its programmes - Polio, Small pox, Malaria and Leprosy (concept, brief accounts and outcome with respect to India). 2.1.4: Ill effects of self-medication **2.2: Water and water supply** 2.2.1: Sources and properties of water.	**15**

	2.2.2: Purification of water, small scale, medium scale and large scale (rapid sand filters) 2.2.3: Water footprint (concept, brief accounts and significance). 2.3: **Hygiene** 2.3.1: Hygiene and health factors at home, personal hygiene, oral hygiene and sex hygiene. 2.4: **Radiation risk** 2.4.1: Mobile Cell tower and electronic gadgets (data of recommended level, effects and precaution). **2.5: Blood bank – Concept and significance**	
III	**Common Human Diseases and Disorders** 3.1: **Stress related disorders** 3.1.1: Hypertension, Diabetes type II, anxiety, insomnia, migraine, depression (cause, symptoms, precaution and remedy) 3.2: **Communicable and non-communicable diseases** 3.2.1: Tuberculosis, Typhoid and Dengue 3.2.2: Hepatitis (A and B), AIDS, Gonorrhea and Syphilis 3.2.3: Diseases of respiratory system- Asthma, Bronchitis. 3.2.4: Oral Cancer (Discuss cause/causative agents, symptoms, diagnostics, precaution /prevention and remedy)	**15**
	Total	**45**

SEMESTER II
Practical Course II-A
Practical UGSC2ZOOP122

(Based on Ecology)

1. Interpretation of the given graphs/ tables and comment on pattern of population nature:
   i. Survivorship curve
   ii. Life tables
   iii. Fecundity tables
   iv. Age structure
   v. Sex ratio
2. a) Calculation of Natality, Mortality, Population density from given data
   b) Estimation of population density by capture recapture method
3. Interpretation of Growth curves (Sigmoid and J shaped)
4. Estimation of hardness from given water sample (tap water v/s well water).
5. Estimation of Free carbon dioxide (Free CO2) from two different samples- aerated drinks(diluted) v/s tap water
6. Identification and interpretation of aquatic and terrestrial (Grassland) food chains and food webs.
7. Construction of food chain/food web using given information/data.
8. a) Identification and interpretation of ecological pyramids of energy, biomass and number
   b) Construction of different types of pyramid from given data.
9. Study of the following:
   a) Endangered (Great Indian Bustard, Asiatic lion, Blackbuck, Olive Ridley sea turtle) and critically endangered species (Slender-billed vulture, Gharial, Malabar civet) of Indian wildlife and state reasons for their decline
   b) Study Biodiversity hotspots using world map (Western Ghats and Indo-Burma)
   c) Study of sanctuaries, national parks, biosphere reserves in India with respect to its brand fauna as listed in theory)
10. Field visit to study biodiversity

***Note - The practicals may be conducted by using specimens authorised by the wild such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended the UGC and as envisaged in the regulations of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals mentioned above.**
#There shall be at least one excursion/field trip

SEMESTER II

Practical Course II-B

Practical UGSC2ZOOP122

(Based on Human Health and Diseases)

1. Study of microscopic structure of starch granules of different cereals (wheat, maize and jowar).
2. Estimation of maltose from brown/white bread.
3. Food adulteration Test:
   a) Milk adulterants (starch and glucose), methylene blue reduction Test (MBRT).
   b) Adulterants in Cheese, Butter, Jaggery, Ghee, Honey, Iodised Salt.
4. a) Estimation of protein content of two egg varieties.
   b) Study of efficacy of different antacids (any two antacids).
5. Study of Human Parasites
   Endoparasites - Protozoans (*Entamoeba, Plasmodium*),
   Helminths (*Ascaris, Wuchereria*),
   Ectoparasites (Head louse, tick) and Exoparasites (Bed bug, Mosquito).
6. Screening of anaemic/non-anaemic persons using CuSO4 method.
7. First Aid – Demonstration Practical Training for teachers and students to be conducted by the experts from Redcorss, Civil defence, Civic authorities by individual institute or cluster colleges in rotation.
8. BMI analysis - Measurement of Height/ Weight and calculation of BMI using formula, preparation and submission of report. (10 students/ group-50 readings/group)

***Note - The practicals may be conducted by using specimens authorised by the wild such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended the UGC and as envisaged in the regulations of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals mentioned above.**

PROPOSED READING MATERIAL / BIBLIOGRAPHY:

Semester I, Zoology Paper I

Course I (UGSC1ZOO0122)

REFERENCES AND ADDITIONAL READING

1. Wonders of the Animal World - University Text Book of Zoology, F.Y.B.Sc. Semester I Course 1. V.V. Dalvie, G.B. Raje, P. Sardesai, N.S. Prabhu, University Press.
2. Vertebrate Zoology Volume I- Jordan and Verma, S. Chand and Co.
3. Invertebrate Zoology Volume II- Jordan andVerma, S. Chand and Co.
4. Invertebrate Zoology- T. C. Majupuria , S. Nagin and Co.
5. Chordate Zoology- P. S. Dhami and J. K. Dhami, R. Chand and Co.
6. Invertebrate Zoology- P. S. Dhami and J. K. Dhami, R. Chand and Co.
7. Introduction to Vertebrates- Moore Cambridge University- Low Priced Edition
8. Zoology- S. A. Miller and J. B. Harley, Tata McGraw Hill
9. Modern Textbook of Zoology, Invertebrates, R. L. Kotpal
10. Fundamentals of Ecology- E. P. Odum , Sunders Publication
11. Fundamentals of Ecology- M.C.Dash-2nd edition, Tata McGraw Hill
12. Essentials of Ecology and Environmental Science - S.V.S Rana
13. Biodiversity- S.V.S Rana- Prentice Hall Publications
14. Modern Biology- V. B. Rastogi
15. Biology of Mollusca- D. R. Khanna
16. A Textbook of Zoology, Vol. II- T. Jeffery Parker and William. A. Haswell- Low Price Publications
17. Ecology and Environment- P. D. Sharma, R. K. Rastogi Publications
18. Introduction to Ecology- R. Dajoz
19. Wildlife Laws and its Impact on Tribes- Mona Purohit , Deep and Deep Publications
20. Biodiversity- K.C.Agarwal- Agro Botanica Publications
21. Butterflies of India – Isaac Kehimkar- BNHS Publication
22. Essential Entomology, G. McGavin., Oxford University Press, 2001.
23. Understanding Entomology, M. Prakash., Discovery Publishing, 2018
24. Elements of Entomology, Rajendra Singh, Rustogi publications, 2007

Semester I, Zoology Paper II

Course II (UGSC1ZOO0222)

REFERENCES AND ADDITIONAL READINGS

1. Basic Laboratory Techniques, Instrumentation and Biotechnology- University Text Book of Zoology, F.Y.B.Sc. Semester I Course 2. V.V. Dalvie, R. G. Deshmukh, R. D'souza and H.U. Shingadia University Press.
2. Introduction to Practical Biochemistry – David T. Plummer (Tata McGraw Hill Publishing Co. Ltd.)
3. Introductory Practical Biochemistry – S.K. Sawhney and Randhir Singh (Narosa Publishing House)
4. Methods in Biostatistics – B. K. Mahajan, (Jaypee Publications)
5. Microscopy and Cell Biology - V. K. Sharma, (Tata McGraw Hill Publishing Co. Ltd.)
6. Bioinstrumentation – L. Veerakumari, (M.J.P. Publishers)
7. Principles and Techniques of Practical Biochemistry – Keith Wilson and John Walker, (Cambridge University Press)
8. Biotechnology- Thieman and Pallidino, Pearson edu.
9. Biotechnology –Glick and Pasternak
10. Biochemistry –Satyanarayana
11. Understanding biotechnology- Aluizio Borem ,David Bowe-Low price edition –Pearson Publication
12. A Textbook of Biotechnology – R. C. Dubey, S. Chand Publication.
13. A Manual of Medical Laboratory Technology -A. H. Patel, Navneet Prakashan Ltd.
14. Biological instruments and methodology – Dr. P. K. Bajpai, S. Chand company Ltd.
15. Calculations in Molecular biology and Biotechnology - Frank H. Stephenson, Academic Press.

Semester II, Zoology Paper I
UGSC2ZOO0122 (Course I)

REFERENCES AND ADDITIONAL READING

1. Introduction to Ecology and Wildlife - University Text Book of Zoology, F.Y.B.Sc. Semester II Course 3. University Press.
2. Fundamentals of Ecology - Eugene P. Odum and Grey W. Barrett, Brook Cole/ Cengage learning
3. Fundamentals of Ecology - M. C. Dash , Tata McGraw Hill company Ltd, New Delhi
4. Ecology - Mohan P. Arora , Himalaya Publishing House
5. Field Biology and Ecology -- Alen H. Benton and William E. Werner ,Tata McGraw Hill ltd, New Delhi
6. Ecology and Environment - Sharma P. D , Rastogi Publication, Mumbai
7. Ecology : Principles and Applications - Chapman J.L , Cambridge University trust
8. Ecology - Subramaniam and Others, Narosa Publishing House
9. Wildlife laws and its impact on tribes - Mona Purohit, Deep and deep Publication
10. Biology - Eldra Solomon, Linda R. Berg and Diana W. Martin, Thomson/ Brooks/ Cole
11. Economic Zoology, Biostats and Animal Behaviour - Shukla, Mathur, Upadhyay, Prasad. Rastogi Publications.

Semester II, Zoology Paper II
UGSC2ZOO0222 (Course II)

REFERENCES AND ADDITIONAL READING

1. Common Diseases, Health and Hygiene - University Text Book of Zoology, F.Y.B.Sc. Semester II Course 4. University Press.
2. Common Medical Symptoms edited - P. J. Mehta National Inblisents and Distributions
3. Parks Textbook of Preventive and Social Medicine K. Park M/S Banarasidas Bhanot Jabalpar.
4. Human Physiology – Volume I – II C. C. Chatterjee, Medical Allied agency, Kolkatta.

5. Parasitology (Protozoology and Helminthoology) - K. D. Chatterjee, Chatterjee Medial Publishers.
6. Nand's handbook of Forensic Medicine and Toxicology - Apurba Nandy, NCBA publication.
7. Essentials of Public Health and Sanitation- Part I and Part II. All India Institute of Local Self Government.
8. Epidemiology and Management for Health Care for all. P.V. Sathe, A. P. Sathe, Popular Prakashan, Mumbai.
9. Textbook of Medical Parasitology- C. K. JayaramPaniker. Jaypee Brothers.
10. A Treatise on Hygiene and Public Health. -B. N. Ghosh. Calcutta Scientific Publishing Company.
11. Prevention of Food Adulteration, Act 1954. Asian Law House.
12. Clinical Dietetics and Nutrition - F. P. Antia and Philip, Oxford University Press.
13. A Complete Handbook of Nature Cure - Dr. H. K. Bakru, Jaico Publishing House.
14. Dietetics - B. Srilakshmi, New Age International (P) Ltd. Publishers.
15. Nutrition: Principles and Application in Health Promotion - J. B. Lippincott Company. Philadelphia.
16. Are You Healing Yourself Mr. Executive - Dr. R. H. Dastur. IBH Publishing Company.
17. Food Nutrition and Health- Dr. Shashi Goyal, Pooja Gupta, S. Chand Publications.
18. Public Health Nutrition. Edited - Michael J. Gidney, Barrie M. Margetts, John M. Kearney and Lenore Arab. Willey Blackwell Publication.
19. Food and Nutrition – Vol. I and II - Dr. Swaminathan , Bappco Publication.
20. Textbook of Human Nutrition - Mahtab Bamji, Prahlad Rao.
21. Total Health by Paramjit Rana.

EXAMINATION PATTERN

I) Continuous Internal Assessment (40 Marks):

Internal assessment of forty (40) marks per course per semester should be conducted.

Distribution of internal 40 marks

Type	Particulars	Assigned marks
A	Field Visits/ Research paper presentation/ Internship/ Group research projects/ Flip classroom	20
B	MCQ tests (online/offline) / Assignment/ Open book test	10
C	Active participation in routine class instructional deliveries.	5
D	Overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	5

For each course, one component from each of above types (A, and B) should be selected.

II) Semester End Examination (60 Marks): Question Paper Pattern

1. These examinations shall be of 2 Hours duration. Maximum marks 60.
2. There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus or as per the directive of BOS.
3. All questions shall be compulsory with internal choice within the questions. (Each question will be of 30 marks with options.)
4. Question may be subdivided into sub-questions A, B, C,… and the allocation of marks depend on the weightage of the topic.

Distribution of external 60 marks

All the Questions are compulsory

Time: 2 hours **Total marks: 60**

Question no.	Sub-question	Total questions	Long answer questions	Marks per question	Unit	Total Marks per Unit
1	A	2	Solve any one	10	I	15
	B	2	Solve any one	5		
2	A	2	Solve any one	10	II	15
	B	2	Solve any one	5		
3	A	2	Solve any one	10	III	15
	B	2	Solve any one	5		
4	A	6	Solve any three	5	I, II & III	15

III) Semester End Practical Examination (100 marks):

Scheme of examination:

1. There will be no internal assessment for practical.
2. A candidate will be allowed to appear for the semester end practical examination only if the candidate submits a certified journal at the time of practical examination of the semester or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of that semester of F. Y. B. Sc. Zoology as per the minimum requirement.
3. The duration of the practical examination will be THREE hours for fifty marks.
4. Students will be examined in two experiments one based on Paper I and other on Paper II.

MODEL QUESTION BANK

SEMESTER I, PAPER I

UGSC1ZOO0122 (COURSE I)

Question bank is suggestive and not exhaustive. The paper setters are free to modify the questions or include new questions to the best of their wisdom

UNIT 1 - (05/10 Marks)

Questions that could be asked for 10 marks:

1. Describe: Mechanism of bioluminescence.
2. Describe the uses of bioluminescence for…… (Noctiluca, Glow worm, Firefly, Angler fish, etc.)
3. Describe the process of regeneration in Earthworm.
4. What is regeneration? Explain the term with an example.
5. Describe: mimicry in butterfly.
6. Describe needs of migration in birds.
7. Describe briefly, the factors inducing migration in birds.
8. Describe briefly the formation of Corals.

Questions that could be asked for 05 marks:

1. Write a short note on types of coral reefs.
2. How does Camel adapt itself to the desert environment?
3. Describe parental care and breeding in ……. (Examples of Pisces, Amphibia)
4. Write a note on echolocation in Dolphins/ Whales.
5. Write a short note on: Pearl formation in Mollusca.
6. Enumerate the uses of bioluminescence.
7. Write a short note on: Luciferin – Luciferase interaction.
8. What is mimicry? Explain with an example.
9. Describe briefly: Brood parasite.
10. Explain parental care in Duck-billed Platypus.

UNIT 2 - (05 Marks/10 Marks)

Questions that could be asked for 10 marks:

1. Explain biodiversity and its importance. What is a biodiversity hotspot? Explain Western Ghats as biodiversity hotspot in India.
2. Explain: Direct use value / Indirect use value.

3. Explain biodiversity and its types.
4. Enumerate and explain threats to biodiversity.
5. State the factors which amount to habitat loss.
6. Explain the concept of Man-Wildlife conflict with an example.
7. Give a detailed account on *in situ* hybridization and *ex-situ* hybridization
8. Describe National Park and state its importance in conservation.
9. Describe Sanctuary and state its importance in conservation.
10. Give a brief account on biosphere reserve.
11. Give a detailed account on: CBD (Convention on Biological Diversity).
12. Give an account of national biodiversity plan 2002.
13. Describe important clauses of Convention for International Trade of endangered species.

Questions that could be asked for 05 marks:

1. Explain biodiversity and mention its types.
2. Explain biodiversity and give two importance.
3. Explain biodiversity hotspot.
4. Describe *in situ* conservation strategies.
5. Write note on *ex-situ* conservation strategies.
6. Give an account of genetic / species / ecosystem biodiversity.
7. Enumerate importance threat to biodiversity.
8. State direct and indirect use value of biodiversity.

UNIT 3 - (05/10 Marks)

1. Write an essay on origin and evolution of insects.
2. Give an account on the various theories dealing with the origin of wings in insects.
3. Write short notes on: (i) Significance of wing flexion (ii) Significance of pupal stage.
4. Enumerate economically important mites infesting animals and plants.
5. Write an essay on economic importance of ticks and mites.
6. Describe the life cycle of any two cattle ticks.
7. Write short notes on: (i)Ticks, (ii) Red spider mites, (iii) Scorpions
8. Give an outline classification of class lnsecta giving examples from each order.
9. Describe the characteristic features of the Class Insecta
10. Write short notes on: Silverfish and Ladybird beetles.

MODEL QUESTION BANK

SEMESTER I, PAPER II
UGSC1ZOO0222 (COURSE II)

Question bank is suggestive and not exhaustive. The paper setters are free to modify the questions or include new questions to the best of their wisdom

UNIT I: (5/10 marks)

1. Describe in brief (Minimum five points)
   a. Good laboratory practices.
   b. Chemical hazards in a laboratory.
   c. Physical hazards in a laboratory.
   d. Biological hazards in a laboratory.
   e. Personal hygiene in laboratory.
   f. Waste disposal.
2. Define and give conversions of the three scales of measuring temperature.
3. Define Molarity. How would you prepare
   a. 1 litre of 0.1 M NaOH solution? (Mol.wt. of NaOH=40).
   b. 100 ml of 1M NaOH.
   c. 500 ml of 0.2 M NaOH.
4. Define Normality. How would you prepare 1 litre of 2 N NaOH solution?
5. Explain briefly the measures of central tendencies?
6. Define mean, median and mode and explain each with an example.
7. The observations of length (in cm) of 10 fishes are 22, 24, 34, 26, 28, 31, 20, 25, 36, 32. Calculate the arithmetic mean of fish length (in cm).
8. Calculate the arithmetic mean for the following data on fish length by direct method.

Class interval (length in cm)	5-15	15-25	25-35	35-45	45-55
Frequency (no. of fish)	9	21	40	22	8

9. Calculate the arithmetic mean for the above data on fish length by shortcut method.
10. How do you find the median of the data and state the significance of median?
11. What is mode? How do you calculate mode for ungrouped and grouped data?
12. What is random sampling? State the significance.

13. Explain simple, subdivided and multiple bar diagrams.
14. What is a pie diagram? Write the formula for calculating the angles of degrees for different components.
15. The following data shows the areas in million square miles of the oceans of the world. Construct a pie diagram for the data.
16. What Plot a histogram/Bar diagram? Explain how it is constructed.

Ocean	Pacific	Atlantic	Indian	Antarctic	Arctic	Total
Area (million sq. miles)	70.8	41.2	28.5	7.6	4.8	152.9

UNIT 2: (5 marks)

1. Give applications of Biotechnology in the field of Medicine / Fishery / Animal Husbandry.
2. Give the Scope of Biotechnology in different areas as a diagrammatic sketch
3. What is SCID? Name the scientist who discovered the gene therapy for it.
4. In SCID which enzyme does not work properly?
5. Which cells are used for SCID gene therapy?
6. Which gene is defective in SCID?
7. Define transgenesis and mention any two transgenic animals.
8. Ethical issues of transgenesis.
9. Enlist five applications of DNA finger printing.
10. What are green genes? State one application of it.

(10 marks)

1. Describe SCID and its treatment with suitable diagram.
2. Explain various methods of transgenesis.
3. What is Cystic fibrosis? Explain its diagnostic biotechnological method.
4. Define transgenesis and explain retro viral method with its application.

UNIT 3: (5/10 marks)

1. Describe the components of a compound microscope giving function.
2. Explain the principle and the applications of compound microscope.
3. Discuss in detail the principle, construction and applications of dissecting microscope.
4. Write the principle and applications of

a) Colorimeter
b) Centrifuge
c) Spectroscopy
d) Compound microscope
e) Dissecting microscope

5. Explain the principle of centrifugation and add a note on its application.
6. What is pH? Give the principle and applications of pH meter.
7. Describe paper chromatography as a separation technique.
8. Describe Agarose gel electrophoresis. Add a note on its applications.
9. Explain the principle and applications of Polyacrylamide gel electrophoresis.
10. With the help of a diagram, explain the parts of a colorimeter. Discuss the principle and uses.
11. Describe principle and uses of colorimeter.
12. Explain the principle and application of adsorption chromatography.

PRACTICALS

UGSC1ZOOP122 (Course I)

Semester I, Paper I

(Based on Biodiversity and Entomology)

Skeleton -Practical Examination Question Paper Pattern

Time: 3 hrs **Marks: 50**

Q1.	From the given sample mount foraminiferan shells (Minimum three types) OR Mounting of scales (placoid and cycloid/ctenoid) from fishes.	(10 Marks)
Q2.	Identify the photograph of the given animals and comment on the type of interaction /speciality. (symbiosis, camouflage, cannibalistic mate eating animals and animal architects, bioluminiscence). Any two	(05 Marks)
Q3.	Identification (one specimen each) a. Types of corals b. Amphibians-breeding and parental care c. Adaptive radiation in reptiles d. Types of feathers/ claws/ beaks in birds e. Types of insect mouthparts f. Types of insect legs/wings g. Types of insect antennae h. Venomous/Non-venomous snake (from photographs).	(20 Marks)
Q4.	Field study report (Biodiversity)	(05 Marks)
Q5.	Viva on study report	(05 Marks)
Q6.	Journal	(05 Marks)

(Note: 1. A certified journal is must at the time of practical examination.
2. There shall be at least one excursion/field trip.)

Semester I, Paper II

Practical UGSC1ZOOP122 (Course I)

(Based on Instrumentation and Biotechnology)

Skeleton -Practical Examination Question Paper Pattern

Time: 3 hrs **Marks: 50**

Q.1.	Dilute the given sample and estimate the OD using colorimeter (Three dilutions) OR Calculate concentration from given OD by formula (3 concentrations) OR Find pH of water samples (three) and comment on their chemical nature. OR Using red cabbage pH indicator, determine pH of the given samples and comment on their chemical nature	(15 Marks)
Q.2.	Perform experiment for separation of pigments by adsorption chromatography. OR Perform experiment for separation of mixture of amino acids by paper chromatography OR Calculate Rf value and identify the pigment from chromatogram. OR Perform Thin Layer Chromatography (TLC) for separation of lipids	(10 Marks)
Q.3.	Focus the given slide under 10 X and 45 X and show it to examiner. OR Prepare a frequency distribution table / Plot histogram / Pie diagram / Bar diagram from the given data.	(05 Marks)
Q.4.	Identification (Safety Symbols (two), parts of compound microscope, transgenic animals, DNA fingerprinting)	(10 Marks)
Q.5.	Viva voce (on practical component)	(05 Marks)
Q.6.	Journal	(05 Marks)

(Note: A certified journal is must at the time of practical examination)

MODEL QUESTION BANK

SEMESTER II, Paper I

UGSC2ZOO0122 (COURSE I)

Question bank is suggestive and not exhaustive. The paper setters are free to modify the questions or include new questions to the best of their wisdom

UNIT 1: (10 marks)

1. Describe with suitable Example.
1. J-Shaped and Sigmoid growth patterns..
2. Population dispersal and distribution patterns.
3. Natality and Mortality
4. Natality and Fecundity
5. Fecundity and Mortality
6. Density dependant fluctuation and oscillations
7. Population interactions
8. Age structure and population density
9. Concept of niche and its significance in population ecology.

Write notes on / Give a brief account of: (5 marks)

1. Population density
2. Natality
3. Mortality
4. Fecundity
5. Age structure
6. Sex ratio
7. Survivorship curve
8. Sigmoid growth pattern
9. J-shaped growth curve
10. Intrinsic mechanism
11. Extrinsic mechanism
12. Niche
13. Population dispersal and distribution pattern

UNIT 2: (5/10 marks)

1. Effect of temperature on metabolism.
2. Impact of temperature on reproduction.
3. Effect of temperature on animal behaviour.
4. Define ecosystem and describe any two abiotic factors.
5. Define ecosystem and describe any two biotic factors.
6. Explain producers / autotrophs.
7. Give a brief account of various levels of consumers in an ecosystem.
8. Describe in short the inter-relationship between biotic and abiotic factors.
9. Describe the following (any one of the cycles can be asked) water cycle, nitrogen cycle and oxygen cycle, sulphur cycle.
10. Explain any one of the following - lake or river.
11. Explain food chain from terrestrial or aquatic ecosystem.
12. What is food web and explain the same with a suitable example.
13. Give a brief account of: Energy pyramid, Pyramid of biomass, Pyramid of numbers.

Unit 3: (5/10 marks question)

1. State the differences between National park and Wildlife Sanctuary?
2. Write an account of critically endangered species of Indian wildlife with at least two examples.
3. Explain briefly management strategy of any one tiger project in India.
4. Briefly explain management strategy of Rhinoceros project in India.
5. Write in detail about Indian Wildlife (Protection) Act 1972.
6. What is biopiracy? Explain with suitable examples.
7. Write a note on flora and fauna of Sanjay Gandhi national park.
8. Write an account of Tadoba tiger reserve project.
9. Give an account of biodiversity of Jim Corbett national park.
10. Write a note on Ranthambore Tiger reserve.
11. Write in details about Gir Lion project.
12. Write a note on Keoladeo Ghana National park.
13. Write an account of biodiversity of Silent valley.
14. Describe in detail about Bandipur sanctuary.
15. Write a note on ecotourism in India with few examples.

SEMESTER II, Paper II

MODEL QUESTION BANK.

UGSC2ZOO0222 (COURSE II)

Question bank is suggestive and not exhaustive. The paper setters are free to modify the questions or include new questions to the best of their wisdom

Unit I (5 marks)

Explain the following:

1. Concept of balanced diet and dietary recommendations of any one of the following:
   a) Normal adult b) Infant c) Pregnant woman d) Aged
2. Cause and symptoms of the following:
   a) Anemia b) B12 deficiency c) Vitamin D deficiency d) Marasmus
   e) Kwashiorkar f) Goiter, g) Swine flu, h) Dengue
3. Precautions and remedy for all above mentioned health conditions.
4. Significance of breast feeding.
5. Importance of fibres in food.
6. Food adulterants and toxins with two side effects of each.
7. Causes, symptoms, precautions and treatment of a) Constipation, b) Piles, c) Insomnia, d) Starvation, e) Flatulence, f) Peptic ulcer, g) Obesity
8. BMI and its significance.

Unit II (5/10 marks)

Question of 5 marks:

1. Give a brief account and outcome of WHO Programs:
   a) Polio b) Smallpox c) Malaria d) Leprosy
2. Explain the concept of health goal and health knowledge.
   b) Enlist different needs of health education.
   c) State five points of social health issues.

Question of 10 marks:

1. Describe sources and properties of water in relation to human consumption.
2. Describe methods of purification of water – small scale, medium scale and large scale.
3. Explain the concept of water footprint and give its significance.
4. Describe disposal of human and animal waste – STP and ETP, its functioning and significance.

5. Give a brief of risk of radiation from mobile cell towers and electronic gadgets.
6. Explain the concepts of physical health, psychological health and myth related to it.
7. Describe the term hygiene and explain in brief health factors related to it at home.
8. Explain personal hygiene, oral hygiene and sex hygiene with significance of each.
9. Describe ill effects of self-medication with respect to antibiotics and steroids.
10. Give brief account of first aid symbols.

Unit III (5/10 marks)

1. Explain causes, symptoms, precautions and remedy

   a) Hypertension b) Diabetes Type II c) Anxiety and Insomnia d) Migraine and depression
2. Explain causes, symptoms, precautions and remedy

   a) Tuberculosis b) Common flu c) Dengue d) Malaria

   e) Typhoid f) Hepatitis A g) Hepatitis B h) AIDS

Semester II, Paper I

Practical UGSC2ZOOP122

(Based on Ecology)

Skeleton -Practical Examination Question Paper Pattern

Time: 3 hrs **Marks: 50**

Q.1.	Estimate Hardness from given water samples and compare the results. **OR** Estimate Free CO2 from given samples and compare the results.	(12 Marks)
Q.2.	Solve the given problems (using statistical approach wherever possible) based on (Any two) Natality/ Mortality/ Sex Ratio/ Fecundity/ Population density	(08 Marks)
Q.3.	Identify brand animals (Min. 4) and place them in their respective National parks/ Sanctuaries on the given map quoting reasons for their decline. **OR** Mark National parks and Sanctuaries on the map of India and mention the name of their brand animals stating reason for their decline. (Min. 4) OR Identify endangered and critically endangered animals (photographs) one each and state their reason of decline	(05 Marks)
Q.4.	Study the given information and give answers on the basis of food chain/food web and ecological pyramids. **OR** Prepare food chain/food web and ecological pyramid from the given data and give its significance**.** **OR** Identify and interpret the given graph/growth curve/age structure and comment on the pattern of population dispersal. **OR** Determine Population density by capture and recapture method.	(07 Marks)
Q.5.	Field report	(08 Marks)
Q.6.	Viva voce (Based on practical component)	(05 Marks)
Q.7.	Journal	(05 Marks)

(Note: 1. A certified journal is must at the time of practical examination.

2. There shall be at least one excursion/field trip.)

Semester II, Paper II
Practical UGSC2ZOOP122
(Based on Human Health and Diseases)
Skeleton -Practical Examination Question Paper Pattern

Time: 3 hrs **Marks: 50**

Q.1.	Estimate Maltose content from bread. **OR** Estimate protein content from two different types of eggs.	(10 Marks)
Q.2.	Analyse the given food sample and identify food adulterants (any 2 samples). **OR** Evaluate milk quality by Methylene Blue Reduction Test (MBRT). **OR** Determine efficacy of different antacids (any two) on acidic solution.	(05 Marks)
Q.3.	On the basis of microscopic structure of starch granules identify different cereals (any two). **OR** Detect adulterants present in the given milk sample (any two). **OR** Determine whether given blood sample is from anaemic/non-anaemic person using CuSO4 Method and suggest the appropriate diet.	(05 Marks)
Q.4.	Identification a) One specimen of Protozoan Parasites. b) One specimen of Helminth Parasites. c) One specimen from Ectoparasite d) One specimen from Exoparasite e) One specimen from Endoparasite	(15 Marks)
Q.5.	Submission of report of Body Mass Index	(05 Marks)
Q.6.	Viva Voce	(05 Marks)
Q.7.	Journal	(05 Marks)

(Note: 1. A certified journal is must at the time of practical examination

2. There shall be at least one excursion/field trip.)

Members of the Board of Studies:

Sr.no.	Name	Category	Affiliation
1.	Shri. Vitthal B. Dandwate	Chairman, HOD in Zoology	Sathaye College (Autonomous)
2.	Dr. Deelip. L. Bharmal	Subject Expert VC Nominee	Principal, S.P.K. Mahavidyalaya, Savantwadi
3.	Dr. Rajaram S. Dubal	Subject Expert outside Parent University	Principal, Rajarshi Chhatrapati Shahu College, Kolhapur.
4.	Dr. Sushilkumar B. Chaudhary	Subject Expert outside Parent University	HoD, Department of Zoology, Institute of Science, Mumbai 32
5.	Shri. Dattatray D. Sangore	Subject Expert from outside the College (Parent University)	HOD Zoology, Kirti M Doongursee College
6.	Dr. Vitthal Mohite	Subject Expert from outside the College (Parent University)	HOD Zoology, Thakur College, Kandivali
7.	Shri. Nandkumar Patil	Industry/Corporate sector/allied area relating to placement	Owner of Avi Chem Industry, Thane.
8.	Shri. Rohan Chavan	Postgraduate meritorious alumnus	S.P.K. Mahavidyalaya, Savantwadi
9.	Dr. Vishal S. Kadu	Faculty of the Department	Sathaye College (Autonomous)
10.	Dr. Ravindra H. Pawara	Faculty of the Department	Sathaye College (Autonomous)
11.	Smt. Amruta D. Pharande	Faculty of the Department	Sathaye College (Autonomous)
12.	Shri. Nikhil D. Yadav	Faculty of the Department	Sathaye College (Autonomous)
13.	Smt. Chetali R. Pandekar	Faculty of the Department	Sathaye College (Autonomous)
14.	Shri. Jitendra R. Shedge	Faculty of the Department	Sathaye College (Autonomous)

Sample Question Skeleton
Zoology-I

Instructions:
1. All the questions are compulsory
2. Figures to the right indicate full marks
3. Draw neat labelled diagram whenever necessary

Q1.	**A) Attempt any ONE of the following**	**10**
	1. Unit I (One question of 10 marks)	
	2. Unit I (One question of 10 marks)	
	B) Attempt any ONE of the following	**5**
	1. Unit I (One question of 5 marks)	
	2. Unit I (One question of 5 marks)	
Q2.	**A) Attempt any ONE of the following**	**10**
	1. Unit II (One question of 10 marks)	
	2. Unit II (One question of 10 marks)	
	B) Attempt any ONE of the following	**5**
	1. Unit II (One question of 5 marks)	
	2. Unit II (One question of 5 marks)	
Q3.	**A) Attempt any ONE of the following**	**10**
	1. Unit III (One question of 10 marks)	
	2. Unit III (One question of 10 marks)	
	B) Attempt any ONE of the following	**5**
	1. Unit III (One question of 5 marks)	
	2. Unit III (One question of 5 marks)	
Q4.	**A) Attempt any THREE of the following**	**15**
	1. Unit I (One question of 5 marks)	
	2. Unit I (One question of 5 marks)	
	3. Unit II (One question of 5 marks)	
	4. Unit II (One question of 5 marks)	
	5. Unit III (One question of 5 marks)	
	6. Unit III (One question of 5 marks)	
