

B.Sc. Part-II (2014-15)
(Semester-III & IV)

Prospectus No. 2015122

संत गाडगेबाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका

विज्ञान स्नातक भाग-२

सत्र-३ व ४, परीक्षा

PROSPECTUS Continued for Semester-III
OF Winter-2013
B.Sc. Part-II Semester-IV Summer 2020
(As it is)

Semester-III Examination Winter-2014, and

Continued for Semester-IV Examination Summer-2015

Semester III Winter 2020,

Semester IV Summer 2021

(As it is)

Continued for Semester-III
Winter-2017

Semester-IV- Summer-2018
(along with notification Nos.
53/2017



Continued for Semester-III Winter-2018

Semester-IV - Summer-2019

Along with Notification Nos. 38/2011
(4/2018)

Continued for Semester-III-Winter 2015

Semester-IV- Summer-2016

2014 (Along with Dir. No.5 of 2015 & Nott.

No.52 of 2015)

Contd. for Semester-III Visit us at www.sgbau.ac.in

Winter-2016

Semester-IV Summer-2017

(Along with Nott. No.37 of 2016)

Nott. No.56 of 2016

(Price-Rs. ३५/-)

BSc.II Semester III

10. ZOOLOGY

There shall be the following paper and practical for B.Sc. Part-II Semester III examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory sessions and 25 practical sessions during the complete semester). There shall be one compulsory theory paper of 3 hours duration, as stated below and a practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks (80 for written examination and 20 marks for internal assessment) and a practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

Semester III

1) Paper-I:		
Life and diversity of Chordata and concepts of evolution		Marks Allotted
Written examination.....	80	
Internal assessment.....	20	
2) Practical:	50	
Total:	150 Marks	

Paper -3 S-Zoology

LIFE AND DIVERSITY OF CHORDATA AND CONCEPT OF EVOLUTION

Unit I : Phylum Chordata;

Origin of Chordata.

Protochordates:— Type study: Amphioxus: Habits and habitat, External Characters - Digestive system and feeding, Excretory organs, gonads- Affinities of Amphioxus.

Affinities of Agnatha:**Series Pisces:**

Type study: *Scoliodon sarrokawah* (Dogfish) – Habits and habitat, External Characters, Digestive system: alimentary canal and digestive glands, Respiratory system: respiratory organ and mechanism of respiration, circulatory System: Structure and working of Heart, major arteries and veins, Lateral line receptors, Migration in fishes-Types, causes and significance.

Unit II : Class Amphibia:

Type Study – *Rana tigerina*, Habits and habitat, external, characters. Respiratory organs- Circulatory system; Structure of Heart, major arteries and veins, urinogenital system.. Parental care in amphibia.

Class Reptilia:

Type study- *Calotes versicolor*- Habits and habitat, External characters, circulatory system- Structure of Heart, major arteries and veins. Urinogenital system, snake venom and anti-venom,

Unit III : Class Aves:

Type study: Pigeon-*Columba livia* Habits and habitat, External characters, Respiratory system, urinogenital system. Flight adaptations, Migration in birds.

Class Mammalia:

Primitive mammals: salient features of Prototheria and Metatheria, Morphology of mammalian endocrine glands. Aquatic mammals.

Unit IV : Evolution: Meaning and scope,

Indirect Evidences of evolution: Evidences of organic evolution- morphological and anatomical, physiological and biochemical, embryological.

Direct evidences of evolution: Paleontological evidences: Fossils and fossilization: petrified fossils dead and preserve bodies cast and moulds, trails and foot prints, condition for fossilizations.-, Radioactive carbon dating of fossils - Living fossils. Importance of fossil record. Evidences from connecting links- Peripatus and Archaeopteryx.

Unit V : Evolutionary Processes: Natural selection: Darwinism.Lamarckism.

Speciation - definition of species -mode of speciation - Allopatric and Sympatric speciation.

Modern concept of organic evolution-Neo Darwinism. Population Genetic :Hardy -Weinberg equilibrium, Gene pool, Gene frequency, Genetic drift, Convergent, Divergent and Parallel evolution, Coevolution

Unit VI : Adaptive radiations in mammals.

Evolution of Man- brief accounts of Parapithecus, Dryopithecus, Ramapithecus, Australopithecus, Homocreatus Neanderthal man,

Cro-Magnon man and modern man.

Evolution of heart, aortic arches, and urinogenital systems of vertebrates

Animal Adaptation: Desert aquatic and terrestrial.

REFERENCE BOOKS:

1. Integrated Principles of Zoology, 7th Edition, Hickman, C.P. Jr., F.M.Hickman and L.S. Roberts, 1984. Times Mirror/Mosby College Publication. St. Louis. 1065 pp.
2. A life of Vertebrate - K.Z.Young, ELBS Oxford University Press.
3. A Text Book of Chordates - H.S.Bharmah and Kavita Juneja.
4. Modern Text Book of Zoology Vertebrate - R.L.Kotpal, Rastogi Publication Meerut.
5. A Text Book of Chordates - A.Thangamani, S, Prasannakumas, L.M.Narayanan and
6. Arunmugam Saras Publication, Nagercoil.
7. A Text Book of Chordate Zoology - R.C.Dalela -Jaiprakashnath Publication Meerut.
8. Chordate Zoology - E.L.Jordan and P.S.Verma, S.Chand and Company New Delhi.
9. A Text book of Practical Zoology Vertebrate - S.S.Lal, Rastogi. Publication, Meeru
10. Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.

11. Chordate Zoology and Elements of Animal Physiology, Jordan, E.K. and P.S. Verma, 1995. 10th edition, S. Chand & Co Ltd., Ram Nagar, New Delhi, 1151 pp.
12. Zoology of Chordates, Nigam, H.C., 1983. Vishal Publications, Jalandhar - 144 008, 942.
13. The Phylum Chordata, Newman, H.H., 1981. Satish Book Enterprise, Agra - 282 003, 477 pp.
14. Text Book of Zoology, Vol. II (Chordata), Parker and Haswell, 1964. A.Z.T., B.S. Publishers and Distributors, New Delhi - 110 051, 952 pp
15. Chordate Structure and Function, Waterman, Allyn J. et al., 1971. Mac Millan & Co., New York, 587 pp.
16. Simpson, G.C. 1967 - The meaning of Evolution. Revised Edition - New Haven, Yale University Press.
17. Colbert, E.H. 1969 - Evolution of Vertebrates, Wiley, New York.
18. Mayr, Ernst, 1973 - Animal Species and Evolution. The Belknap Press of Harvard University, Cambridge.
19. Dobzansky, T. 1976 - Genetics and the Origin of Species. Oxford and TBH Publishing Co. New Delhi.
20. Savage, J.M. 1976 - Evolution. Amerind Publishing Co. Pvt. Ltd. New Delhi.
21. Elic. Minkoff, 1983 - Evolutionary Biology, Addison Wesley.
22. Life, Origin, Evolution and Adaption (2002) - Sanjib Chattopadhyay. Books and Allied (p) Ltd.
23. P.S. Verma & V.K. Agrawal. (2008) Cell Biology, Genetics, Molecular Biology, Evolution & Ecology - S. Chand Publications.
24. Dhabade. D.S. I. A. Raja. R.A. > Gulhane. A.P. Charjan. A.K. Patki., And P.S. Patil., A Text Book of Evolution: Sanket Publicatin. Washim
25. Zoology for Degree Students, Prof. Dr. V.K. Agrawal.

Practical:-

Two practical per week of 3 periods duration. Examination shall be of 5 Hrs duration and of 50 marks.

A) Taxonomy of Chordata:

1. **General characters and classification of Phylum Chordata:**

2. **General characters and Classification up to orders of the following chordates or as per the availability in the laboratory from the major orders, (Specimens or Models):**

Protochordata: Herdmania, Doliolum Salpa, Amphioxus.

Agnatha: Petromyzon, Myxine.

Pisces: Scoliodon, Torpedo, Acipenser, Exocoetus.
Hippocampus

Amphibia: Ichthyophis, Salamander, Bufo, Hyla.

Reptilia: Varanus, Phrynosoma, Chameleon, Cobra, krait, Russell's viper, Typhlops, Hydrophis

Aves: Duck, Woodpecker, Kingfisher, Parrot.

Mammalia: Mongoose, Squirrel. Manis. Bat., monkey,

B) Anatomical Study through Computer Aided-Technique, Video Clipping, Models, Photographs and other available resources

1. Frog: Viscera, Digestive system, Male Reproductive System, Female Reproductive System.

2. Rat/Mouse/Rabbit-Digestive System, Arterial System, Venous System, Reproductive Systems.

C) Slides of Hair Impression of different locally available Mammals.

D) Osteology: Rabbit/ Fowl Excluding loose bones.

E) Evolution:

1. Study of fossils, including living fossils.

2. Study of Evidences of evolution.

i) Analogous and Homologous organs.

ii) Connecting links (Peripatus, Archaeopteryx, Limulus)

iii) Embryological evidences

3. Application of Hardyweinberg's law

4. Study of Mesozoic Reptiles (By Models/Charts).

5. Mimicry, coloration in animals.

6. Beak and Leg modifications with reference to: Parrot, Woodpecker, Kingfisher, Heron, Duck, Sparrow/Pigeon Hawk/Kite, Owl.

Semester IV

1) Paper-I:	Marks Allotted
Advanced Genetics and Animal Ecology.	
Written examination.....	80
Internal assessment	20
2) Practical:	50
Total:	150 Marks

ZOOLOGY Paper 4 S
ADVANCED GENETICS AND ANIMAL ECOLOGY

UNIT I : Concept of genes.

Mendel's laws of hereditary – Monohybrid – Laws of dominance, law of segregation. Dihybrid cross – Law of independent assortment. Interactions of genes: , Supplementary factor, complementary factor, duplicates factor, inhibitory factors, and lethal factors – dominant and recessive.

UNIT II : Linkage - Types of linkage, linkage group, arrangement of linked genes, and significance of linkage.

Crossing over – Mitotic and meiotic crossing over, Mechanism of crossing over, theories of crossing over – Darlington's theory, breakage and exchange theory, and copy choice theory. Types of crossing over – Single, double and multiple crossing overs. Factors affecting crossing over, Significance of crossing over.

Multiple alleles. Multiple alleles in relation to eye color in *Drosophila*. Blood group in man, Erythroblastosis foetalis

UNIT III : Sex determination: Autosomes and sex chromosomes, Sex determination in animals, Chromosomal Theory. Genic Balance Theory. Environmentally and hormonally controlled sex determination, Gynandromorphs.

Genetic disorders; Sickle cell anemia, , Huntington's chorea. Diabetes mellitus. Non-disjunction: Turner's syndrome, Klinefelter's syndrome, Down's syndrome. Edward's

Syndrome, Biochemical genetics:; Cystic fibrosis, Phenylketonuria, Albinism, Alkaptonuria, Goiters, cretinism. Sex linked genetic disorders and their inheritance in man; Hemophilia and color blindness.

UNIT IV : Genetic Screening and parental diagnosis: - Parental, Carrier, Predictive, CVS (Chorionic Villous Sampling), Amniocentesis, Gene probe and DNA analysis. Genes in Human Heredity: - Inheritance of eye color. Skin color. Recessive genes and consanguineous marriages Genetic counseling: - Risk of marriages in affected family. Birth control measures (male and female).

Kinds of twins: - Identical, Fraternal, Siamese twins.
.Significance of twins study

UNIT V : Ecology: concept and scope:

Abiotic factors:

Water: Properties, water problem in terrestrial and aquatic habitat. **Temperature:** Temperature range, Temperature tolerance, Effects of temperature on animals. Homeotherms, poikilotherms. Dormancy, hibernation, aestivation & diapause. **Light:** Spectral

distribution, Biological effects of light on aquatic and terrestrial animals: Reproduction, Metamorphosis, pigmentation, vision, photo kinesis, phototropism, photoperiodism, migration.

Biotic factors:

Intra specific and interspecific associations, Predation, parasitism, Antagonism, commensalisms, mutualism, competition, (Gauze's Principle).

UNIT VI : Ecosystem: Relationship between habitat and ecological niche - Autotrophic and heterotrophic producer, consumer - trophic level - energy flow in an ecosystem - food chain - food web - pyramids - Ecotypes. Homeostasis of ecosystem.

Terrestrial ecosystem: Classification and Biomes, Aquatic ecosystem: Fresh water ecosystem-Lentic and lotic ecosystem,

Marine ecosystem: Characteristics, salinity, temperature - pressure, zonation and stratification Estuarine ecology: Characteristics types, fauna and their adaptations.

REFERENCE BOOKS:

1. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology – P.S. Verma & V.K. Agrawal.
2. Principles of Genetics – S.K. Jain
3. Genetics – P.K. Gupta
4. Applied Genetics – C. Pmmanuol.
5. Genetics: M. W. Strickberger, New York.
6. Principles of Genetics: Sinnott, Dunn and Dobzansky.
7. Principles of Genetics: Edidon Gardner.
8. Genetics. Verma, P.S. and V.K. Agarwal.. S.Chand & co. New Delhi
9. Gene VI .Lewin, B. 1998. Wiley Eastern Ltd., New Delhi.
10. Human Genetics. Rothwell, N. V. 1979. Prentice Hall of India, New Delhi

Practical:-

Two practical per week of 3 periods duration. Examination shall be of 5 Hrs. duration and of 50 marks.

A) Genetic experiments:

1. Recording of Mendelian traits in man.
2. Detection of monohybrid and dihybrid cross with the help of plastic beads.
3. Culturing *Drosophila* using standard methods .*Drosophila* – male and female identification, Mutant forms (from pictures)
4. Demonstration of bar bodies.
5. Preparation of human Karyotypes from Xerox pictures.
6. Photo slides for, Turner's syndrome, Klinefelter's syndrome, Down's syndrome
7. Detection of syndrome from chromosome spread picture.
8. Study of following human genetic traits and application of Hardy-Weinberg Principle to them – Baldness, length of index and ring Finger, attached and free earlobes, rolling of tongue, PTC taste. Other notable traits.

B) Ecology

1. Use of pH meter for estimation of pH in soil samples, b. Use of pH meter for estimation of pH in water samples
2. Estimation of Dissolved oxygen, salinity, pH, free CO₂, carbonates and bicarbonates, calcium in water samples.
3. Adaptations of aquatic and terrestrial animals based on a study of museum specimens. Such as rocky, sandy, muddy shore animals, flying and burrowing animals.
4. Study of natural ecosystem and field report of the visit.
5. Field collection methods;
6. Identification of common animals - Soil invertebrate diversity, diversity of birds and mammals in parks / botanical gardens, threats to local biodiversity.
7. Construction of a food web diagram based on a field visit.
8. Mounting of plankton.
9. Qualitative analysis of fresh water plankton

C) General:-

1. Visit to a National park or sanctuary, and submission of report.

**DISTRIBUTION OF MARKS FOR
PRACTICAL EXAMINATION.**

1. Ecological: Estimations -/Analysis	10
2. Spotting. (2 Spot from Sec.A & 3 Spot from Section B of 2 Marks each)	10
3. Micro preparation.	05
4. Genetic experiment -	10
5. Class record	05
6. Viva - Voce	05
7. Submission of study tour report.	05

Total Marks : 50
