

B.Sc. Final (Sem-V & VI)
Exam. 2015-16

Prospectus No. 2016123

संत गाडगेबाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका
विज्ञान स्नातक अंत्य परीक्षा
सत्र-५-हिवाळी-२०१५
सत्र-६-उन्हाळी-२०१६

PROSPECTUS
OF
The Examination for the Bachelor of Science
Semester-V, Winter-2015, and
Semester-VI, Summer-2016
& Onwards



2015

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**B.SC. FINAL, SEMESTER-V
10 : ZOOLOGY**

There shall be the following paper and practical for B.Sc. Part-III Semester V 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 a compulsory theory paper of 3 hours duration, as stated below and a practical examination extending for five 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.

Theory -5 S-ZOOLOGY:

(ANIMAL PHYSIOLOGY AND ECONOMIC ZOOLOGY)

	Marks Allotted
1) Written examination	80
Internal assessment	20
2) Practical:	50
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Total: í í	150 Marks

Paper 5 S-ZOOLOGY

(ANIMAL PHYSIOLOGY AND ECONOMIC ZOOLOGY)

Max. Marks - 100 Total

Period - 75

UNIT I : Respiration:

Structure of respiratory organs: Gills and Lungs

Mechanism of respiration: regulation of ventilation in lungs, exchange of gases at respiratory surface, Respiratory pigments in animals: Haemoglobin, Haemocyanin, Haemerythrin, chlorocruorin. Transport of gases: O₂ and CO₂ transport, Neurophysiologic control of respiration,

Circulation:

Blood : Definition and its constituents, functions of blood. Heart: Structure of human heart, pace maker, Cardiac cycle. Blood coagulation factors, blood groups A, B, O system and Rh-factor.

UNIT II: Muscle Physiology:

Types of Muscles: striated, non-striated and cardiac muscles

E.M. Structure and **Chemical** Composition of striated muscle, Neuromuscular junction.

Mechanism of muscle contraction by Sliding filament theory

Physical and Chemical changes during muscle contraction: muscle twitch, tetanus, isometric and isotonic contraction, summation of Stimuli, all or none law, fatigue, rigor mortis.

UNIT III : Nerve Physiology: Neuron: E.M. Structure of neuron and Types : Myelinated and non-Myelinated nerve fibres.

Conduction of Nerve impulse, Resting potential, initiation and propagation of action potential, Saltatory transmission, Neurotransmitters (Acetylcholine, dopamine, GABA, Serotonin, Epinephrine, Nor-Epinephrine), Synapse and synaptic transmission

Chemical co-ordination: Endocrine system: Hormones and their physiological roles of-

Pituitary, Thyroid, Parathyroid, Adrenal, Islets of Langerhanø,

Hormonal disorders: Dwarfism, Gigantism, Acromegaly , Goiter, Myxoedema, Cretinism, Osteoporosis ,

UNIT IV : Reproductive Physiology: Estrous and menstrual cycle, hormonal control of reproduction in males and female, Structure and physiology of mammalian Placenta.

Homeostasis and conservative regulation: Osmoregulation and ionic regulation in aquatic animals. Osmoregulation in terrestrial animals Ammonotelism, ureotelism and uricotelism.

Thermoregulation in Poikilotherms and Homeotherms.

UNIT V : Agricultural Zoology: Economic importance of Insects

Beneficial insects ô Spider, Mantis, Ladybugs, Damsel bug, Mealybug destroyer, Soldier beetle,

Green lacewing, Syrphid fly, Tachinid fly, Ichneumon wasp

and Trichogramma wasp.

Harmful Insects – Stored food grain pests, their injuries and control

Pests of, Cotton, Sugarcane and Jowar. Damage and Control
Economic importance of Rodents, Snakes, Owls and Bats.
Apiculture - Sericulture -

Unit VI : Aquaculture

Aquaculture: definition, scope, importance and present status in India.

Fresh water fish culture: types of fish ponds: Nursery, rearing and stocking, design and construction of fish pond, fertilizers used for fish development.

Hatching Hapas, Chinese Circular Hatchery, CIFE, Mumbai, hatching model, Induced breeding and hypophysation, Modern drugs used in fish breeding.

Freshwater system: monoculture, polyculture, integrated aquaculture, cage culture, pen culture. Fish products and byproducts: Fish liver Oil, Fish body oil, Fish manure, Fish leather

Special Note : (Common for B.Sc.Sem-I & VI)

- (i) Use of animals for practical purpose in this curriculum is subject to the conditions, under the Wild Life (Protection) Act 1972 and should abide by the prevention of cruelty to animals Act 1960. No any scheduled animal species should be used in the laboratory.
- ii) The research based project on animals should strictly abide by the rule as mentioned in para-6 of U.G.C. Notification No.F.14-6/2014 (CPP-II), dated 1st August, 2014, which state that
 - 6.1 All institutions of Higher Education shall constitute Dissection Monitoring Committees (DMC) to ensure strict compliance of instructions relating to the use of animals for research purposes only;
 - 6.2 The Head of the concerned department shall be the Convener and Chairperson of DMC. Two Senior faculty members of the concerned department, one faculty member

of a related department from the same institution and one or two Faculty members of the concerned department from the neighboring institution(s) shall be members of DMC.

- 6.3 The tenure of DMC shall be two years and on expiry of a term, the DMC should be reconstituted wherein only the Convener and Chairperson (The Head of the Department) may continue for two or more terms if he/she happens to continue to be the Head of the Department. A vacancy arising during the tenure of DMC shall be filled with a faculty belonging to the respective category. The quorum for the meeting shall be 3 out of 6, where in at least one member from the neighboring institution must be present. The DMC shall meet at least once each semester/ half year and approve/ review alternative experimentation of animals for laboratory exercises.
- 6.4 It shall be the responsibility of the DMC to ensure that animals that are permitted to be used for dissections / experiments in the instructions herein are procured from ethical sources, and not removed from the wild, transported to the laboratory without stress or strain to the animals, if live, and anaesthetized appropriately if they are to be used in dissections.
- 6.5 The DMC shall ensure that the institution maintains appropriate records of procurement of animals, their transport, number of animals used, use of anesthesia/ euthanasia etc.
- 6.6 The DMC shall be different from the Institutional Animal Ethics Committee (IAEC), under the purview of Committee for purpose of care and supervision of experimental animals (CPCSEA), Department of Environment and Forest, Govt. of India. However, the DMC shall not have powers to overriding the powers of IAEC. For animals covered by the IAEC, with standard operating procedures (SOPS) for IAECs prescribed by CPCSEA will apply.

- iii) Those Institutions which are already having Zoology museums should not procure museum specimens now onwards and should use charts / slides / models / photographs and digital alternatives in case of need. Those new institutions which are not having Zoology museum in their department should provide learning related to zoological specimens with the help of charts / slides / models / photographs and digital alternatives / and arrange visit of students to already established museums.

Practicals:

1. Detection of blood groups in human being.
2. Differential counts of blood.
3. Estimation of hemoglobin percentage with the help of haemometer.
4. R.B.C. count.
5. W.B.C. count.
6. Preparation of haemin crystals
7. Measurement of blood pressure.
8. Action of salivary amylase on starch.
9. Qualitative detection of nitrogenous waste products (Ammonia, urea, uric acid) in given sample.
10. Demonstration of kymograph unit, Respirometer through available resources.
11. Observation and identification of Insect Pests of local crops, and predator insects.
12. Life Cycles of Honey bee, Lac insect, Silk Moth.
13. Histological Slides of major organs of Respiratory systems, circulatory system, Nervous system, Different types of Muscles, Endocrine glands, testis, ovary.
14. Study of locally available fishes, Indian major carps, Exotic carps, Common carp.

Distribution of marks for practical examination :

Time: 5 Hrs.	Marks
01. Physiological Expt.	
a) Major í í í í í í í í í í í ...	10
b) Minor í í í í í í í í í í í ...	05
02. Economic Zoology & Histology	

a) Spotting (A-F)	12
b) Description and Comments on Topic from Unit V and VI	08
04. Class record duly signed by teacher in charge and certified by H.O.D.	05
05. Study tour report.	05
06. Viva - voce	05

Total Marks 50

REFERENCES

1. Prosser and Brown : Comparative Animal Physiology
2. Histological Slides of Respirator systems, circulatory system, Muscles, Nervous system Endocrine glands, Gonads, placenta
3. Guyton : Physiology
4. Best and Taylor : Physiological basis of Medical practice
5. C Hoar, W.S.. General and comparative Physiology. Prentice Hall of India.
6. Lehninger. L.. Biochemistry. W.H. Freeman & co.
7. Nagabushnam, R.. Animal physiology. S.Chand & co.
8. Martin, D.W. P.A. Mayes and W.W. Rodwell,, Harper& Review of Biochemistry lange Medical Publications.
9. Prosser, C.L. and F.A.Brown Comparative Animal physiology. W.B. Saunders.
10. Rama Rao, A.V.S.S.. Biochemistry. UBSPD.
11. Stryer. L. Biochemistry Wiley International
12. Verma, P.S. and V.K. Agarwal.. Animal physiology. S.Chand & co.
13. Wilson, J.A., Principles of Animal Physiology, Macmillan
14. Chatterjee, C.J; Human Physiology(Vol-I and II)
15. Economic Zoology, G.S. Shukla, V.B. Upadhyay (2006)
16. Text Book of Applied Zoology, Pradip. V Jabde (2005).
17. Mac E. Hadley: Endocrinology, Prentice Hall, International Edition, 2000

B.SC. FINAL, SEMESTER-VI ZOOLOGY

There shall be the following paper and practical for B.Sc. Part-III Semester VI 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 a compulsory

theory paper of 3 hours duration, as stated below and a practical examination extending for five 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.

Theory -6 S-ZOOLOGY

(MOLECULAR BIOLOGY AND BIOTECHNOLOGY)

	Marks Allotted
1) Written examination	80
Internal assessment	20
2) Practical:	50
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Total:	150 Marks

Paper- 6 S-ZOOLOGY

(MOLECULAR BIOLOGY AND BIOTECHNOLOGY)

Max. Marks - 100

Total Period - 75

UNIT – I : Genetic material-definition, Experiments to prove DNA as genetic material:Griffiths transformation experiments with bacteriophage infections, Avery and co-workers experiments, and Hershey and Chase experiment. Chemistry and types DNA(A,B,Z)Mitochondrial DNA; Chemistry, types and function of RNA: mRNA, tRNA and rRNA and Non Genetic RNA.

UNIT - II : DNA replication: semi conservative method; experiment by Messelson and Stahl.

Concept of genes, one gene one enzyme hypothesis, one gene one Polypeptide theory.; A brief account of Concept and action of cistron, split genes, overlapping genes, jumping genes, Genetic diseases: Spinocerebellar ataxia.

UNIT-III : Genetic code and its features, Protein synthesis-transcription and processing of mRNA, translation-different steps, Gene regulation: (promoter and operator), Operon models, and Lac-operon model of E.Coli. Genetic regulation in Eukaryotes-Britten Davidson Model.

UNIT-IV : Mutation: Definition-mutation theory of DeVries-different types of mutations, - molecular basis of mutation:

substitution and frameshift mutations, chromosomal aberrations-structural(deletion, addition, inversion and translocation),numerical (euploidy and aneuploidy). Natural and induced mutations-significance of mutations.

DNA repair process.

Polymerase chain reaction (PCR). Southern, Northern and Western blotting techniques, DNA finger printing.

UNIT – V : Biotechnology:. Genetic Engineering: Recombinant DNA technology and gene cloning-enzymes in recombinant DNA technology, Splicing and cloning of genes, vectors (plasmid and phage vectors), gene Transfer. Somatic cell hybridization, hybridoma technology, and monoclonal antibodies. Practical applications and suspected hazards of biotechnology and genetic engineering in animals.

UNIT-VI : Immunology: Introduction to immune system: Innate and adaptive immunity, Types and production of immune cells ; Complement system.

Humoral Immunity: Antigen and haptens, Antibody: types function, and production.

Cell mediated immunity: T-cell receptors, T helper cell and lymphocyte activation

Role of cytotoxic T-cell..ELIZA Technique RIA.

Practicals:

1. Microtechnique scope and importance.
2. Preparation of fixatives - Alcohol, Acetone, Formalin, Bouin's fluid, Cornoy fluid, Formal sublimate.
3. Collection of various tissues/organs from slaughter house for micro-technique
4. Preparation of Alcoholic grades, dehydration and clearing of tissues
5. Use and care of Oven
6. Embedding and block making, trimming of block.
7. Use and Care of different types of Microtome.
8. Honing and stropping Knives
9. Section cutting and spreading,

10. Preparation of various stains -Borax carmine Acetocarmin, Aceto-orcein, Haematoxyline, eosin.
11. Staining of the sections, (Double Staining), mounting.
12. Camera Lucida. Use and Drawings
13. Oculomicrometer scale/ similar micro-measurements use
14. Introduction to models of PCR, Southern blotting through available resources.
15. Vital Staining of mitochondria by using Janus, Green B stain.
16. Extraction of DNA by using salt, detergent and enzymes from natural sources from any animal tissue / plant material
17. Study of Operon models through available resources.
18. Application of DNA finger printing through available resources.

Distribution of marks for practical examination:

Time: 5 Hrs.	Marks
01 Microtechnique.	
a) Trimming and Section cutting of the Paraffin blocks	05
b) Spreading of ribbons.	05
c) Staining of the given slide	10
c) Use of camera Lucida/ Ocular micrometer scales	05
02. Any one practical based on Sr.14 to 18 of the practical list	10
03. Permanent slides submitted by the examinee (5 Slides)	05
04. Class record duly signed by teacher incharge and certified By H.O.D.	05
05. Viva - voce	05

Total Marks 50

REFERENCES

1. Friefelder. D. Microbial Genetics; Narosa Publishing, New Delhi.
2. Goodenough, U. Genetics. Saunders Coolege Publishing International, New York.
3. Klug, W.S. and M.R.Cummings. Concepts in Genetics; Charles E.Merrill Publishing Co. London.
4. Kumar, H.D. Molecular biology and biotechnology. Vikas Publishing House, New Delhi.
5. Lewin, B.. Gene VI . Wiley Eastern Ltd., New Delhi.
6. Rothwell, N.V. Human Genetics. Prentice Hall of India, New Delhi.
7. Sinnott, E.W.L.C.Dunn, and L.C.Dobzhansky, T. 1985. Principles

- of Genetics. Tata McGraw Hill. New Delhi.
8. Stern, C. Principles of Human genetics. S.Chand & Co. New Delhi.
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11. Chopra, V.L and A.Nasim.. Genetic Engineering and Biotechnology. Oxford & I BH, New Delhi.
12. Dharmarajan, M. Genetic Engineering S.viswanathan & Co.
13. Dubey, R.C.1995. Text book of Biotechnology. S.Chand & Co.
14. Glick, B.R. J.J. and Pastermak. 1998. Molecular Biotechnology. SSM Press, Washington.
15. Gupta, P.K. Elements of Biotechnology. Rastogi Publications, Meerut.
16. Jogdand, S.N. Advances in Biotechnology. Himalaya Publishing, New Delhi.
17. Kumar, H.D.. A text book on Biotechnology. East West Affiliated Press Ltd.
18. Proter, D.G. Ethical scores for animal experiments. Nature 356: 101-102.
19. Primrose, S.M. Modern Biotechnology. Blackwell Scientific Publishers, Oxford.
20. Trevan, M.D. Biotechnology: The Biological principles. Tata McGraw Hill Publishing Co., New Delhi.
21. Trehan, K. Biotechnology. Wiley eastern ltd., New Delhi.
22. Vijayaraman, K.S.Chellammal and P.Manikili. 1998. Uyiriyathozhilnutpam. Chimeeraa, Tiruchy.
23. AM. Pearson & TA Gillett (1996) Processed Meats,
24. W.J. Stadelman, V.M. Olson, GA. Shemwell & S. Pasch S.
25. Egg and poultry meat processing,
26. Bremner (2002) Fish as Food, Vol 1 & 2, HA
27. Ivan Roitt: Essential Immunology (6th Ed.) Oxford, Backwill, Science publication London.
28. Elgert: Immunology understanding the immune system, John Willy & Sons, Inc. publication, New York.

B.Sc. Final year (Semester V)

11 : STATISTICS

The examination in Statistics of fifth semester will comprise of one theory paper each, internal assessment and practical examination.