ZOOLOGY

B. Sc. III: Sem V

ANIMAL PHYSIOLOGY AND ECONOMIC 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

Total: …… 150 Marks

Animal Physiology and Economic Zoology

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 nuron andTypes : Myelinated and nonMyelinated 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 Langerhan's, 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 – Spider, Mantis, Ladybugs, Damsel bug, Mealybug destroyer, Soldier beetle, Green lacewing, Syrphid fly, Tachinid fly, Ichneumon wasp and Trichogramma wasp. Harmful Insects –Stired 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–: definition, scope, importance and present status in India. Fresh water fish culture: types of fish ponds:Nursary, rearing and stocking, design and construction of fish pond, fertilizers used for fish development. Hatching Happas, Chinease 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.

Practicals: Animal Physiology and Economic Zoology

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.

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Distribution of marks for practical examination : Time: 5 Hrs. Marks

01. Physiological Expt.
    a) Major…… 10
    b) Minor …… 05
02. Economic Zoology

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

Total Marks 50

REFERENCES

1. Prosser and Brown : Comparative Animal Physiology
2. Hisotlogical Slides of Respirator systems, circulatory system, Muscles, Nervous system Endocrine glands, Gonads, placentae
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's Review of Biochemistry lange Medical Publications.
9. Prosser, C.L. and F.A.Brown Comparative Animal physiology. W.B. Suanders.
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

ZOOLOGY
B. Sc. III: Sem VI
MOLECULAR BIOLOGY AND BIOTECHNOLOGY

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.

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

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 Lacoperon 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 engineeringin 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: 6 S-(MOLECULAR BIOLOGY AND BIOTECHNOLOGY)

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 79 80 of Genetics. Tata McGraw Hill. New Delhi.
8. Stern, C. Principles of Human genetics. S.Chand & Co. New Delhi.
9. Verma, P.S. and V.K. Agarwal.. Genetics. S.Chand & Co. New Delhi.
10. Balasubramania, D., Concepts in Biotechnology. Unversity Press (India) Ltd., Hyderabad.
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.