YOGI VEMANA UNIVERSITY :KADAPA

ZOOLOGY CBCS SYLLABUS COURSE STRUCTURE

YEAR	SEMESTER	PAPER	TITLE	HRS.	CREDITS	IA	ES	TOTAL
I	I	I	Biology of Non-chordates	4	3	25	75	100
			Practical - I	2	2	50	0	50
	II	II	Biology of Chordates	4	3	25	75	100
			Practical - II	2	2	0	50	50
II	III	III	Cell biology, Genetics and Evolution	4	3	25	75	100
			Practical - III	2	2	50	0	50
	IV	IV	Embryology, Physiology and Ecology	4	3	25	75	100
			Practical - IV	2	2	0	50	50
III	V	V	Animal Biotechnology	4	3	25	75	100
			Practical - V	2	2	50	0	50
		VI	Animal Husbandry	4	3	25	75	100
			Practical - VI	2	2	50	0	50
	VI	VII	Immunology	4	3	25	75	100
			Practical - VII	2	2	0	50	50
		Cluster VIII-A	Cluster Electives –VIII-A : Aquaculture					
			1. Principles of Aquaculture	4	3	25	75	100
			2. Aquaculture Management	4	3	25	75	100
			3. Post Harvest Technology	4	3	25	75	100
			Practical – VIII: 1	2	2	0	50	50
			Practical – VIII: 2	2	2	0	50	50
			Project Work-	2	2	0	50	50

ZOOLOGY SYLLABUS FOR I SEMESTER

ZOOLOGY - PAPER - I

ANIMAL DIVERSITY - NONCHORDATES

Periods:60 Max. Marks:100

Brief history, Significance of Diversity of Non Chordates

Protozoa

- General characters
- Classification of Protozoa up to classes with examples
- Elphidium (type study)

Porifera

- General characters
- Classification of Porifera up to classes with examples
- Sycon – External Characters, Types of cells,
- Skelton in Sponges
- Canal system in sponges

Unit - II

Coelenterata

- General characters
- Classification of Coelenterata up to classes with examples
- Obelia - External Characters, Structure of Polyp and Medusa
- Polymorphism in coelenterates
- Corals and coral reef formation

Platyhelminthes

- General characters
- Classification of Platyhelminthes upto classes with examples
- Fasciola hepatica, Reproductive System, Life History and pathogenicity

Unit - III

Nemathelminthes

- General characters
- Classification of Nemathelminthes up to classes with examples

Annelida

- General characters
- Classification of Annelida up to classes with examples
- Hirudinaria granulosa, Digestive System, Reproductive System
- Coelomoducts
- Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Unit - IV

Arthropoda

- General characters
- Classification of Arthropoda up to classes with examples
- Prawn, Appendages, Respiratory system
- Peripatus - Structure and affinities

Mollusca

- General characters
- Classification of Mollusca up to classes with examples
- Pearl formation in Pelecypoda
- Torsion in gastropods

Unit - V

Echinodermata

- General characters
- Classification of Echinodermata up to classes with examples
- Water vascular system in star fish

Hemichordata

- General characters
- Classification of Hemichordata up to classes with examples
- Balanoglossus - Structure and affinities

Non-Chordata larval forms

- Amphiblastula
- Nauplius
- Bipinnaria
- Tornaria

ZOOLOGY MODEL QUESTION PAPER FOR I SEMESTER

ZOOLOGY - PAPER - I

ANIMAL DIVERSITY - NONCHORDATES

Time : 3 hrs Max. Marks : 75

I. Answer any FIVE of the following : 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR I SEMESTER

ZOOLOGY - PAPER - I
ANIMAL DIVERSITY - NONCHORDATES

Periods: 24 Max. Marks: 50

Observation of the following slides / spotters / models

Protozoa	:	Elphidium, Paramecium - Binary fission and conjugation
Porifera	:	Spoonbill, Euspongia, Sycon, Sycon - T.S and L.S
Coelenterata	:	Obelia - colony and medusa, Physalia, Velella, Corallium, Gorgonia, Pennatula
Platyhelminthes	:	Planaria, Fasciola hepatica, Fasciola larval forms - Miracidium, Redia, Cercaria, Echinococcus granulosus
Nemathelminthes	:	Ascaris - Male and female, Ancylostoma duodenale
Annelida	:	Neries, Heteroneries, Aphrodite, Hirudo, Trochophore larva
Arthropoda	:	Mouth parts of male and female Anopheles and Culex, Mouth parts of housefly, Mouth parts of Scorpion, Nauplius, Mysis, Zoea larvae, crab, prawn, Scolopendra, Sacculina, Limulus, Peripatus
Mollusca	:	Chiton, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
Echinodermata	:	Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Asterias, Bipinnaria larva
Hemichordata	:	Balanoglossus, Tornaria larva

Demonstration of dissection / dissected / virtual dissection :

1. Leech / Prawn / Scorpion / Crab - Digestive system
2. Prawn - Appendages
3. Prawn / Scorpion / Crab - Nervous system
4. Pila / Unio - Digestive system
5. Mounting of Statocyst
6. Mounting of Radula

b Laboratory record work shall be submitted at the time of practical examination

b Compulsory one species to be adopted for demonstration only by the faculty

b Computer aided techniques should be adopted as per UGC guide lines

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ZOOLOGY SYLLABUS FOR II SEMESTER

ZOOLOGY - PAPER - II

ANIMAL DIVERSITY - CHORDATES

Periods:60 Max. Marks: 100

Unit - I

General characters of Chordata

Prochordata

- Salient features of Cephalochordata
- Affinities of Cephalochordata
- Salient features of Urochordata
- Structure and life history of Herdmania
- Significance of Retrogressive metamorphosis

Unit - II

Cyclostomata

- General characters of Cyclostomata
- Comparision of the Petromyzon and Myxine

Pisces

- General characters of Fishes
- Classification of fishes up to sub - class level with examples
- Scoliodon, Digestive system, Heart, Brain
- Migration in Fishes
- Types of Scales
- Dipnoi

Unit - III

3.1 Amphibia

- General characters of Amphibian
- Classification of Amphibia upto orders with examples.
- Rana hexadactyla, Digestive system, Respiratory system, Heart

Reptilia

- General characters of Reptilia
- Classification of Reptilia upto orders with examples
- Identification of Poisonous snakes and Skull in reptiles

Unit - IV

Aves

General characters of Aves

Classification of Aves upto subclasses with examples.

Columba livia, Digestive system, Respiratory system, Heart.

Migration in Birds

- Flight adaptation in birds

Unit - V

Mammalia

- General characters of Mammalia
- Classification of Mammalia upto sub - classes with examples

Comparision of Prototherians, Metatherians and Eutherians

Dentition in mammals

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ZOOLOGY MODEL QUESTION PAPER FOR II SEMESTER

ZOOLOGY - PAPER - II

ANIMAL DIVERSITY - CHORDATES

Time: 3 hrs | Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

1. Amphioxus
2. Placoid scale
3. Quill feather
4. Prototheria
5. Anadromous migration
6. Draco
7. Emu
8. Apoda

II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

9. Explain the life history of Herdmania

OR

Explain the origin and general characters of chordates

10. Compare the characters of Petromyzon and Myxine

OR

Describe the structure of heart of Scoliodon

11. Describe the brain of Rana hexadactyla

OR

Explain the external features of Calotes

12. Write an essay on flight adaptations in birds

OR

Explain the respiratory system of Columba livia

13. Compare the characters of Metatheria and Eutheria

OR

Write an essay on dentition in mammals

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ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER

ZOOLOGY - PAPER - II

ANIMAL DIVERSITY - CHORDATES

Periods: 24 Max. Marks: 50

Observation of the following slides / spotters / models

Protochordata	:	Herdmania, Amphioxus, Amphioxus T.S. through pharynx
Cyclostomata	:	Petromyzon, Myxine
Pisces	:	Pristis, Torpedo, Channapleuronectes, Hippocampus, Exocoetus, Eheneis, Labeo, Catla, Clarius, Auguilla,Protopterus
		Placoid scale, Cycloid scale, Ctenoid scale
Amphibia	:	Ichthyophis, Amblystoma, Siren, Hyla, Rachophous
		Axolotl larva
Reptilia	:	Draco, Chemaeleon, Uromastix, Vipera russeli, Naja, Bungarus, Enhydrina, Testudo, Trionyx, Crocodilus
Aves	:	Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo, Study of different types of feathers : Quill, Contour, Filoplume down
Mammalia	:	Ornithorthynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog
Osteology	:	Appendicular skeletons of Varanus, Pigeon
		Rabbit - Skull, fore limbs, hind limbs and girdles

Demonstration of dissection / dissected / virtual dissection:

1. V, VII, IX, X cranial nerves of shark / locally available fishes
2. Arterial system, venous system of Shark / Calotes / Fowl / Rat
3. Digestive system of fish

b Laboratory record work shall be submitted at the time of practical examination

b Compulsory one species to be adopted for demonstration only be the faculty

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ZOOLOGY SYLLABUS FOR III SEMESTER

ZOOLOGY - PAPER - III

CYTOLOGY, GENETICS AND EVOLUTION

Periods:60 Max. Marks:100

Unit - I

1. Cytology - I

Definition, history, prokaryotic and eukaryotic cells, virus

Electron microscopic structure of eukaryotic cell.

Plasma membrane –Different models of plasma membrane.

Unit – II

2. Cell organelles

Structure and functions of Endoplasmic Reticulum

Structure and functions of Golgi apparatus

Structure and functions of Lysosomes

Structure and functions of Ribosomes

Structure and functions of Mitochondria

2.7. Chromatin, Chromosomes - Structure, types, functions

Unit - III

Genetics - I

Mendel's work on transmission on traits

Principles of inheritance

Incomplete dominance and codominance

Lethal alleles, Epistasis, Pleiotropy

Unit - IV

Genetics - II

Sex determination

Sex linked inheritance

Linkage and crossing over

Extra chromosomal inheritance

Human karyotyping

Unit - V

Evolution

Lamarckism, Darwinism, Hardy-Weinberg Equilibrium.

Variations, isolating mechanisms, natural selection

Speciation (Allopatric and Sympatric)

Macro evolutionary principles (Example: Darwin's finches)

ZOOLOGY MODEL QUESTION PAPER FOR III SEMESTER

ZOOLOGY - PAPER - III

CYTOLOGY, GENETICS AND EVOLUTION

Time: 3 hrs Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - PAPER - III

CYTOLOGY, GENETICS AND EVOLUTION

Periods: 24 Max. Marks: 50

I. Cytology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of Chiranomous

II. Genetics

1. Study of Mendelian inheritance using suitable examples
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin's finches (pictures)
5. Visit to natural history museum and submission of report

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ZOOLOGY SYLLABUS FOR IV SEMESTER

ZOOLOGY - PAPER - IV

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

Periods:60 Max. Marks: 100

Unit - I

Developmental Biology and Embryology

Gametogenesis

Types of eggs

Formation and functions of Foetal membrane in chick embryo

Development, types and functions of Placenta in mammals

Unit - II

Physiology - I

Elementary study of process of digestion

Absorption of digested food

Respiration - Pulmonary ventilation, transport of oxygen and carbondioxide

Circulation - Structure and functioning of heart, Cardiac cycle

Excretion - Structure of nephron, urine formation, counter current mechanism

Unit - III

Physiology - II

Nerve impulse transmission, origin and propagation of action potentials

Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle contraction

Endocrine glands - Structure, secretions and the functions (of hormones) of pituitary, thyroid, parathyroid, adrenal glands and pancreas

Hormonal control of reproduction in a mammal

Unit - IV

Ecology - I

Meaning and scope of Ecology

Nutrient cycles - Nitrogen, carbon and phosphorus

Components of Ecosystem (Example:lake), food chains and food web, energy flow in ecosystem

Unit - V

Ecology - II

Habitat and ecological niche

Community interactions - Mutualism, commensalism, parasitism, competition, predation

Ecological succession

Zoogeography

Zoogeographical regions

Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions

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ZOOLOGY MODEL PAPER FOR IV SEMESTER

ZOOLOGY - PAPER - IV

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

Time: 3 hrs Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR IV SEMESTER

ZOOLOGY - PAPER - IV

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

Periods: 24 Max. Marks: 50

I. Embryology

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Study of activity of salivary amylase under optimum conditions
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage

III. Ecology

1. Determination of pH of given sample
2. Estimation of dissolved oxygen of given sample
3. Estimation of total alkalinity of given sample
4. Estimation of salinity of given sample

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ZOOLOGY SYLLABUS FOR V SEMESTER

ZOOLOGY - PAPER - V

ANIMAL BIOTECHNOLOGY

Periods:60 Max. Marks:100

Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors

Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

Cloning Vectors: Plasmid vectors:pBR and pUC series, Bacteriophage, Cosmids.

Unit 2 Techniques of Recombinant DNA technology

Cloning: Use of linkers and adaptors

PCR: Basics of PCR.

Hybridization techniques: Southern, Northern and Western blotting,

Genomic and cDNA libraries: Preparation and uses

UNIT 3 Animal Cell Technology

Cell cultures: primary culture, secondary culture, Organ culture; Cryopreservation of cultures.

Hybridoma Technology: Production of Monoclonal antibodies (mAb), Applications of mAb

Stem cells: Types of stem cells, applications of stem ell technology in cell based therapy.

Unit 4 Reproductive Technologies & Transgenic Animals

Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization , super ovulation, Embryo transfer

Transgenic Animals: Transgenic - sheep, - fish; applications

Unit 5 Applied Biotechnology

Industry: Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous;

Agriculture: fisheries – monoculture in fishes, polyploidy in fishes; DNA fingerprinting

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ZOOLOGY MODEL PAPER FOR V SEMESTER

ZOOLOGY - PAPER - V

ANIMAL BIOTECHNOLOGY

Time: 3 hrs Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY

Periods: 24 Max. Marks: 50

Any SIX of the following:

1. Maintenance and storage ofE.coli DH5 alpha cells.
2. Isolation of Plasmid DNA from E.coli
3. Preparation of genomic DNA from E. coli/animals/ human.
4. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation for insertion and vector for ligation.
7. Performance of ligation reaction using T4 DNA ligase.
8. Preparation of competent cells
9. Transformation of E. coli with plasmid DNA using CaCl2,
10. Selection of transformants on X-gal and IPTG
11. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
12. Interpretation of sequencing gel electropherograms
13. Amplification of DNA by PCR
14.Packing and sterilization of glass and plastic wares for cell culture.
15,Preparation of culture media.

SUGGESTED READING

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
4. Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press
5. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
6. Brown TA. (2007). Genomes-3. Garland Science Publishers
7. Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.
8. Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific Publishers Limited.
9. Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
11. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

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ZOOLOGY SYLLABUS FOR V SEMESTER

ZOOLOGY - PAPER - VI

ANIMAL HUSBANDRY

Periods:60 Max. Marks: 100

UNIT – I : 10 Hours

General introduction to poultry farming. Principles of poultry housing. Poultry houses. Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers.

UNIT – II: 10 Hours

Poultry feed management – Principles of feeding. Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III: 10 Hours

Selection, care and handling of hatching eggs. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.

UNIT- IV: 20 Hours

Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. (Three each category). Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn. Cleaning and sanitation of dairy farm. Weaning of calf. Castration and dehorning. Deworming.

UNIT - V: 10 Hours

Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.

ZOOLOGY MODEL PAPER FOR V SEMESTER

ZOOLOGY - PAPER - VI

ANIMAL HUSBANDRY

Time: 3 hrs | Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY –PRACTICAL - VI

ANIMAL HUSBANDRY

Periods:24 Max. Marks: 50

1. Study of various breeds of layers and broilers (photographs)
2. Identification of disease causing organisms in poultry birds (as per theory)
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
5. Study of various breeds of cattle (photographs/microfilms)
6. Study of various activities carried out in a dairy farm and submission of a report.

ZOOLOGY SYLLABUS FOR VI SEMESTER

ZOOLOGY –ELECTIVE PAPER:VII

IMMUNOLOGY

Periods:60 Max. Marks:100

Unit - I

Overview of Immune system

Introduction to basic concepts in Immunology

Innate and adaptive immunity

Cells and organs of Immune system

Cells of immune system

Organs of immune system

Unit - II

Antigens

Basic properties of antigens

B and T cell epitopes, haptens

Factors influencing immunogenicity

Unit - III

Antibodies

Structure of antibody

Classes and functions of antibodies

3.1.3Monoclonal antibodies

Unit - IV

Working of Immune system

Structure and functions of major histocompatibility complexes

Exogenes and Endogenes pathways of antigen presentation and processing

Basic properties and functions of cytokines

Unit - V

Immune system in health and disease

Classification and brief description of various types of hyper sensitivities

Introduction to concepts of autoimmunity and immunodeficiency

Vaccines

General introduction to vaccines

Types of vaccines

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ZOOLOGY MODEL PAPER FOR VI SEMESTER

ZOOLOGY - ELECTIVE PAPER – VII

IMMUNOLOGY

Time: 3 hrs Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

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ZOOLOGY PRACTICAL SYLLABUS FOR VI SEMESTER

ZOOLOGY - ELECTIVE PAPER – VII

IMMUNOLOGY

Periods: 24 Max. Marks: 50

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
    a. ELISA
    b. Immunoelectrophoresis

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VI SEMESTER
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-A:
AQUACULTURE

Cluster Elective Paper: VIII-A-1

PRINCIPLES OF AQUACULTURE

Periods:60 Max.Marks:100

Unit – I

Introduction / Basics of Aquaculture
Definition, Significance and History of Aquaculture
Major cultivable species for aquaculture: freshwater, brackish water and marine.
Criteria for the selection of species for culture

Unit – II

Types of Aquaculture
Freshwater, Brackishwater and Marine
Concept of Monoculture, Polyculture,Composite culture, Monosex culture and Integrated fish farming
Culture practices
Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish.

Unit – III

Design and construction of aquafarms
Criteria for the selection of site for freshwater and brackish water pond farms
Design and construction of fish and shrimp farms
Nutrition and feeds
Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

Management of carp culture ponds
4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting ofponds

Unit – V

Culture of shrimp (Penaeus monodon or Litopenaeus vannamei)
Culture of pearl oysters
Culture of ornamental fishes – Setting up and maintenance of aquarium.

REFERENCES BOOKS

1. Bardach, JE et al. 1972. Aquaculture – The farming and husbandry of freshwater and marine organisms, John Wiley & Sons, New York.
2. Bose AN et al.1991. Coastal aquaculture Engineering. Oxford & IBH Publ.Co.Pvt.Ltd.
3. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House.
4. FAO. 2007. Manual on Freshwater Prawn Farming.
5. Huet J. 1986. A text Book of Fish Culture. Fishing News Books Ltd.
6. ICAR. 2006. Hand Book of Fisheries and Aquaculture. ICAR.
7. Ivar LO. 2007. Aquaculture Engineering. Daya Publ. House.
8. Jhingran V.G. 2007. Fish and Fisheries of India. Hindustan Publ. Corporation, India.
9. Landau M. 1992. Introduction to Aquaculture. John Wiley & Sons.
10. Lovell RT.1998. Nutrition and Feeding of fishes. Chapman & Hall.
11. Mcvey JP. 1983. Handbook of Mariculture. CRC Press.
12. MPEDA: Handbooks on culture of carp, shrimp, etc.
13. New MB. 2000. Freshwater Prawn Farming. CRC Publ.
14. Pillay TVR.1990. Aquaculture- Principles and Practices, Fishing News Books Ltd., London.
15. Pillay TVR & Kutty MN. 2005. Aquaculture- Principles and Practices. 2nd Ed. Blackwell
16. Rath RK. 2000. Freshwater Aquaculture. Scientific Publ.
14. Stickney RR. 1979. Principles of Warmwater Fish Culture, John Wiley & Sons
15. Wheaton FW. 1977. Aquacultural Engineering. John Wiley & Sons.

ZOOLOGY MODEL PAPER FOR VI SEMESTER

Cluster Elective Paper: VIII-A-1

PRINCIPLES OF AQUACULTURE

Time : 3 hrs Max. Marks : 75

I. Answer any FIVE of the following : 5x5=25

Draw labeled diagrams wherever necessary

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Draw labeled diagrams wherever necessary

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Cluster Elective Paper: VIII-A-2

AQUACULTURE MANAGEMENT

Periods : 60 Max.Marks : 100

Unit – I

Breeding and Hatchery Management

Bundh Breeding and Induced breeding of carp by Hypophysation; and use of synthetic hormones

Types of fish hatcheries; Hatchery management of Indian major carps

Breeding and Hatchery management of Penaeus monodon

Unit – II

Water quality Management

Water quality and soil characteristics suitable for fish and shrimp culture

Identification of oxygen depletion problems and control mechanisms in culture ponds

Liming materials, Organic manures and Inorganic fertilizers commonly used and their implications in fish ponds

Unit – III

Feed Management

Live Foods and their role in shrimp larval nutrition.

Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics.

Feed formulation and manufacturing; Feed storage

Unit – IV

Disease Management

Principles of disease diagnosis and health management;

Prophylaxis, Hygiene and Therapy of fish diseases

Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

Unit – V

Economics and Marketing

5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis

5.1.2Fish marketing methods in India; Basic concepts in demand and price analysis

Fish Genetics

Genetic improvement of fish stocks – Hybridization of fish.

Cryopreservation of gametes, Production of monosex and sterile fishes and their significance in aquaculture.

REFERENCE BOOKS

1. Boyd CE. 1979. Water Quality in Warm Water Fish Ponds. Auburn University
2. Boyd, CE. 1982. Water Quality Management for Pond Fish Culture. Elsevier Sci. Publ. Co.
3. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House
4. Conroy CA and Herman RL. 1968. Text book of Fish Diseases. TFH (Great Britain) Ltd, England.
5Halver J & Hardy RW. 2002. Fish Nutrition. Academic Press.
6. Ian C. 1984. Marketing in Fisheries and Aquaculture. Fishing News Books.
7. ICAR. 2006. Handbook of Fisheries and Aquaculture. ICAR.
8. Jhingran VG. 2007. Fish and Fisheries of India. Hindustan Publishing Corporation, India.

9. Jhingran VG & Pullin RSV. 1985. Hatchery Manual for the Common, Chinese and Indian Major Carps. ICLARM, Philippines.
10. Kumar D. 1996. Aquaculture Extension Services Review: India. FAO Fisheries CircularNo. 906, Rome.
11. Lavens P & Sorgeloos P. 1996. Manual on the Production and Use of Live Food for Aquaculture. FAO Fisheries Tech. Paper 361, FAO.
12. MPEDA. 1993. Handbook on Aqua Farming - Live Feed. Micro Algal Culture. MPEDA Publication
13. New MB. 1987. Feed and Feeding of Fish and Shrimp. A Manual on the Preparation and Preservation of Compound Feeds for Shrimp and Fish in Aquaculture. FAO – ADCP/REP/87/26
14. Pandian TJ, Strüssmann CA & Marian MP. 2005. Fish Genetics and Aquaculture Biotechnology. Science Publ.
15.Pilley, TVR & Dill, WMA. 1979. Advances in Aquaculture. Fishing News Books, Ltd. England.
16. Pillay TVR & Kutty MN. 2005. Aquaculture- Principles and Practices. Blackwell.
17. Ray GL. 2006. Extension, Communication and Management. 6th Ed. Kalyani Publ. Delhi.
18. ReddyPVGK, AyyappanS, ThampyDM & Gopalakrishna 2005.Text Book of Fish Genetics and Biotechnol. ICAR
19. Reichenbach KH. 1965. Fish Pathology. TFH (Gt. Britain) Ltd, England.
20.Shang YC. 1990. Aquaculture Economic Analysis - An Introduction. World Aquaculture Society, USA.
21. Singh B. 2006. Marine Biotechnology and Aquculture Development. Daya Publ. House
22.Stickney RR. 1979. Principles of Warm waterAquaculture. John-Willey & sons Inc.
23. Swain P, Sahoo PK & Ayyappan S. 2005. Fish and Shellfish Immunology: An Introduction. Narendra Publ.
24. Thomas PC, Rath SC & Mohapatra KD.2003.Breeding and Seed Production of Finfish and Shellfish. Daya Publ.

ZOOLOGY MODEL PAPER FOR VI SEMESTER

ZOOLOGY - PAPER - VIII

Cluster Elective Paper: VIII-A-2

AQUACULTURE MANAGEMENT

Time : 3 hrs Max. Marks : 75

I. Answer any FIVE of the following : 5x5=25

Draw labeled diagrams wherever necessary

1.

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7.

8.

II. Answer any FIVE of the following : 5x10=50

Draw labeled diagrams wherever necessary

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OR

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OR

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OR

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Cluster Elective Paper: VIII-A-3

POST HARVEST TECHNOLOGY

Periods : 60 Max.Marks : 100

Unit – I

Handling and Principles of fish Preservation

Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage).

Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to lowradiation of gamma rays.

Unit – II

Methods of fish Preservation

Traditional methods - sun drying, salt curing, pickling and smoking.

Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

Processing and preservation of fish and fish by-products

Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

Unit – IV

Sanitation and Quality control

Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

Unit – V

Quality Assurance, Management and Certification

Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

REFERENCE BOOKS

1. Balachandran KK. 2001. Post-harvest Technology of Fish and Fish Products. Daya Publ.
2. Bond, et al. 1971. Fish Inspection and Quality Control. Fishing News Books, England.
3 Clucas IJ. 1981. Fish Handling, Preservation and Processing in the Tropics. Parts I, II. FAO.
4. Gopakumar K. (Ed.). 2002. Text Book of Fish Processing Technology. ICAR.
5. Govindan, TK.1985. Fish Processing Technology, Oxford-IBH.
6. Hall GM. (Ed). 1992. Fish Processing Technology. Blackie.
7. Huss HH, Jakobsen M & Liston J. 1991. Quality Assurance in the Fish Industry. Elsevier.
8. John DEV. 1985. Food Safety and Toxicity. CRC Press.
9. Krenzer R. 1971. Fish Inspection and Quality Control. Fishing News.
10. Larousse J & Brown BE. 1997. Food Canning Technology. Wiley VCH.
11. Nambudiri DD. 2006. Technology of Fishery Products. Fishing Chimes.
12. Regenssein JM & Regenssein CE.1991. Introduction to Fish Technology.VanNostrand Reinhold.
13. Rudolf K. 1969. Freezing and Irradiation of Fish. Fishing News (Books).
14. Sen DP. 2005. Advances in Fish Processing Technology. Allied Publ.

ZOOLOGY MODEL PAPER FOR VI SEMESTER

Cluster Elective Paper: VIII-A-3

: POST HARVEST TECHNOLOGY

Time : 3 hrs Max. Marks : 75

I. Answer any FIVE of the following : 5x5=25

Draw labeled diagrams wherever necessary

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II. Answer any FIVE of the following : 5x10=50

Draw labeled diagrams wherever necessary

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OR

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OR

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ZOOLOGY PRACTICLSYLLABUSCLUSTER ELECTIVE PAPER: VIII-A

VI SEMESTER

AQUACULTURE

PRACTICAL: I

Periods : 24 Max.Marks : 50

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any Five
2. Identification and study of important cultivable and edible crustaceans - Any Three
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample; Estimation of dissolved oxygen, free carbondioxide, total alkalinity
2. Soil analysis – Determination of soil texture, pH
3. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Total 5

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PRACTICAL - II

Periods :24 Max.Marks : 50

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates

Post harvest Technology

1. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
2. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. ?
3. Analysis worksheet, plan form and corrective action procedures in processing of fish.

PRACTICAL - III

Project Work

Visit to a fish breeding centre / fish farms and submit a project report

or

Visit to a feed manufacturing unit and submit a project report

or

Visit to a shrimp hatchery / shrimp farms and submit a project report

or

Visit to a shrimp processing unit and submit a project report

1.A.S.Bhushnam	Chairman, BOS	Sri Lakshmi Srinivasa Degree College, Pullareddy Peta	
2. Nagendra Prasad	Member	SVDC,Kadapa	
3.K.Suryaprakasha Reddy	Member	SVDC,Kadapa	
4. Pitchi Reddy	Member	Sri Lakshmi Srinivasa Degree College, Pullareddy Peta	
5. Head/Coordinator Dept.of Zoology	University Nominee	Yogi Vemana University Kadapa	

Other Zoology lectures :-

1. L. Venkata Rami reddy SKSC, DC Proddatur
2. Swarana meri, SKR & SKR, Kadapa.
3. Aruna, SKR & SKR, Kadapa.
4. Venu Gopal, SKR & SKR, Kadapa.
5. P.Sabitha, SCNR, DC, Proddatur.
6. M.Rama Mohan SVDC,Proddatur
7. A.Ramesh Babu,Sri Hari Degree college, Kadapa.