PG/IVS/ZOO/403(A.1, A.2, B.1, B.2, C.1, C.2, D.1, D.2)/24

M.Sc. 4th Semester Examination, 2024

ZOOLOGY

PAPER—ZOO-403(A.1, A.2, B.1, B.2, C.1, C.2, D.1, D.2)

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

ZOO-403-A.1

Special : Fishery

(*Aquaculture and Fish Technology*)

1. Answer the following questions (any *two*) : 2×2

(*a*) What are the main objectives of aquaculture ?

(*b*) State the role of synthetic hormones in fish breeding

(*c*) How to prevent fish spoilage ?

(*d*) Write a note on : FAO (Food and Agriculture Organization).

2. Answer the following questions (any *two*) : 4×2

(*a*) How would you do the management of a pond for fish culture ?

(*b*) Mention the steps involved in artificial breeding of fish.

(*c*) State the application of Biotechnological tools in fishery sciences. Write a note on : Fish Byproducts.

(*d*) Write the following (any *two*) : 2×2

(*i*) Cage culture system

(*ii*) Water quality maintenance in fish production

(*iii*) Predatory fish

(*iv*) Integrated fish farming.

3. Answer the following questions (any *one*) : 8×1

(*a*) What is Entrepreneurship and state its characteristics. Briefly describe the culture process of ornamental fishes in rural Bengal. $2+3+3$

(*b*) Answer the following (any *four*) : 2×4

(*i*) Biofloc culture

(*ii*) Weed fishes

(*iii*) Fishery co-operatives

(*iv*) Cryopreservation

(*v*) Biology of shell fish

(*vi*) Torrymeter

(*vii*) Biofertilizer

(*vii*) Fishery extention activity.

ZOO-403-A.2

(*Limnology and Oceanography*)

4. Answer the following questions (any *two*) : 2×2

(*a*) Why Estuaries are important ?

(*b*) What are the factors influencing fish production in reservoir ?

(*c*) What is Sludge treatment ?

(*d*) Write a note on : Upwelling.

5. Answer the following questions (any *two*) : 4×2

(*a*) How the lakes are formed by the Earth's movements ?

(*b*) Mention the different steps of Reservoir fisheries and their management in India. $2 + 2$

(*c*) How organisms are adapt to a Lotic environment ?

(*d*) Write notes on (any *two*) : 2×2

(*i*) Oceanic faunal resource

(*ii*) Abiotic factors of Lentic ecosystem

(*iii*) Demersal fishes

(*iv*) Oxidative ponds.

6. Answer the following question (any *one*) : 8×1

(*a*) Why ocean pollution is a problem ? How does ocean pollution affect humans ? What is the biggest source of pollution in the ocean ? $2\frac{1}{2} + 2\frac{1}{2} + 3$

(*b*) What is Remote Sensing and what are the use for Aquaculture systems ? How RS-System works ? 1 + 2 + 5

[Internal Assessment – 10 Marks]

ZOO-403-B.1

Special : *Ecology* (*Systems Ecology*)

1. Answer any *two* questions from the following : 2 × 2

(*a*) Enlist the attributes of a restored ecosystem.

(*b*) Define the 5 capitals-framework of ecological economics.

(*c*) Establish Ecotourism as a conservation tool.

(*d*) What are the parameters to be assessed for vegetation health ?

2. Answer any *two* questions from the following : 4×2

(*a*) What do the terms patch, corridor and matrix signify ? Comment on Rescue effect. $3 + 1$

(*b*) Describe the natural causes of lake formation.

(*c*) State the reasons for different types of dispersion in natural communities.

(*d*) State of the role of termites in forest ecosystem.

3. Answer any *one* question from the following : 8×1

(*a*) (*i*) Illustrate Plant stratification in a tropical forest.

(*ii*) What is the difference between holomixis and meromixis ? What happens in case of dimictic lakes ?

(*b*) Write notes on any *four* of the following : 2×4

(*i*) Species richness and evenness components of diversity

(*ii*) Ecotone and Edge effect

(*iii*) Thermal Stratification in a lake ecosystem

(*iv*) Levine's metapopulation theory

(*v*) Phytophagous and Xylophagous insects in forests

(*vi*) Deterministic and stochastic models

(*vii*) Mull and Mor humus.

ZOO-403-B.2

Special : Ecology (*Human Ecology*)

4. Answer any *two* questions from the following : 2×2

(*a*) Write a note on the Leopold Matrix method.

(*b*) How are biomedical wastes further sorted into different categories ?

(*c*) State the difference between wet and dry acid rain.

(*d*) What is Intramural transportation of BMW ?

5. Answer any *two* questions from the following : 4×2

(*a*) Define watershed. How to reclaim a wastelend ? 1 + 3

(*b*) What is the major cause of soil erosion ? What is gully erosion ? 3 + 1

(*c*) Mention the steps of EIA as identified by UNEP (1996).

(*d*) What is Bio-invasion ? *Give an example.*

6. Answer any *one* question from the following : 8×1

(*a*) (*i*) Differentiate between Rapid EIA and Comprehensive EIA.

(*ii*) Summarize the role of people's participation in Sustainable environmental management. $4 + 4$

(*b*) (*i*) Discuss about the various forms and significance of carbon sequestration.

(*ii*) Enumerate the factors accounting for the Global warming.

[Internal Assessment — 10 Marks]

ZOO-403-C.1

(*Gentics Diseases and Molecular Analysis*)

1. Answer any *two* questions from the following : 2×2

(*a*) How do you fix annealing temperature for PCR reaction ?

(*b*) In what ways expression vector differ from cloning vector ?

(*c*) What is the use of 'Histidine Tags' (His_6) in the expression vector ?

(*d*) What do you mean by terminal transferase activity of Taq Polymerase ?

2. Answer any *two* questions from the following : 2×4

(*a*) What do you mean by repetitive DNA sequence ? How does repetitive DNA is used in RFLP ? Give example.

(*b*) What do you mean by α-complementation ? Why do we use IPTG and X-Gal during *blue-white* screening ?

(*c*) Describe step by step strategy for the construction of recombinant plasmid vector for single gene cloning.

(*d*) What are the properties of primers considered during primer designing. What do you mean by FRET ?

3. Answer any *one* question from the following : 8×1

(*a*) (*i*) In what way liquid phase pyrosequencing differs from solid phase pyrosequencing. State the advantages of liquid phase method. $3 + 2$

(*ii*) How do you link mutation of secretase enzyme with formation of extracellular senile plagues in Alzheimer's disease. 3

(*b*) State properties of fluorescent probes used in real time PCR with example. State the mechanism of scorpion and Taqman probe used in real time PCR. 2+3+3

ZOO-403-C.2

(*Applied Genetics*)

4. Answer any *two* questions from the following: 2×2

(*a*) What are three families of DNA segments encoded by the antibody heavy chain gene ?

(*b*) Show the location of 12 bp and 23 bp RSS space in TCR gene.

(*c*) Mention lymphoid specific enzymes participating in the recombination process.

(*d*) What kind of mutation gives rise to Huntington disease ?

5. Answer any *two* questions from the following : 4×2

(*a*) How coding joints and signal joints are created in V(D)J recombination ?

(*b*) Describe a recombination-based system of recognition molecule that does not depend on RSSs.

(*c*) You are mapping a gene that causes human genetic disease. The gene is linked to a RFLP detected with a probe called X-21. You hybridize labelled X-21 DNA to DNAs from a panel to mouse-human hybrid cells. The following shows the human chromosome present in each hybrid cell line and whether the probe hybridized to DNA from each which human chromosome carries the disease gene ?

Cell line	Human Chromosome Content	Hybridization to X-21
A	1, 5, 21	+
B	6, 7	–
C	1, 22, Y	–
D	4, 5, 18, 21	+
E	8, 21, Y	–
F	2, 5, 6	+

(*d*) Show the characteristic features of Mouse TCR β-chain and α-chain.

6. Answer any *one* question from the following : 8×1

(*a*) Write the comparison of the mechanism of the generation and expression of diversity among B-cell and T-cell receptor molecules.

(*b*) (*i*) How Gusella and collegnas are able to locate *HD* (Huntington Disease) to human chromosomes.

(*ii*) Why Exon trapping is so important ?

(*iii*) What is HTF island ? Mention its significance. $3+2\frac{1}{2}+2\frac{1}{2}$

[Internal Assessment — 10 Marks]

ZOO-403-D.1

(*Vector Biology and Vector Borne Parasites*)

1. Answer any *two* questions from the following : 2×2

(*a*) What do you mean by cyclopropagative, cyclodevelopmental and transovarian transmission. Give examples.

(*b*) What is red water fever ?

(*c*) What are ctenidium and pygidium ?

(*d*) Write the medical importance of black fly.

2. Answer any *two* questions from the following : 4 × 2

(*a*) What is hypostome ? Write the differences between ticks and mites. Write the scientific name of human flea and cat flea. 1 + 2 + 1

(*b*) What is myiasis ? Comment on ecological classification of myiasis. 1 + 3

(*c*) What is 'Q' fever ? Write notes on Brucellosis. 1 + 3

(*d*) Elaborate the features of endemic and epidemic typhus. 4

3. Answer any *one* question from the following : 8 × 1

(*a*) Describe the life cycle, pathogenecity and control of *Babesia* sp. 5 + 2 + 1

(*b*) Diascuss about the symptoms, diagnosis and control of lyme disease. Write notes on flea control. 5 + 3

ZOO-403-D.2

(Molecular Diagnosis and Clinical Parasitology)

4. Answer any *two* questions from the following : 2×2

(*a*) How DNA is labelled of the 5′ end ?

(*b*) Mention the mode of detection of hybridization of non-radioactively (biotin) labelled DNA.

(*c*) What are the advantages and disadvantages (limitation) of radioimmuno assay (RIA) ?

(*d*) Why are alkaline phosphatase (ALP) and horseradish peroxidase (HRP) commonly used for conjugating with antibody ?

5. Answer any *two* questions from the following : 4 × 2

(*a*) Describe the labelling of DNA by random priming method. How are unicorporated labelled nucleotides removed from the reaction mixture. 3 + 1

(*b*) Explain how complement fixation test is used to detect presence of antigen specific antibody in a serum sample.

(*c*) Describe the morphology of *Trichomonas vaginalis* with labelled diagram.

(*d*) Comment on epidemiology and transmission ecology of *Clonorchis sinensis*.

6. Answer any *one* question from the following : 8 × 1

(*a*) Draw and label the typical configuration of a lateral flow immunoassay (LFA) test

strip. Explain the principle of each component of this test. Mention the application and advantage of LFA.

2 + 4 + 2

(*b*) Describe the life cycle, pathogenecity and control of *Dracunculus medinensis*.

5 + 2 + 1

[Internal Assessment — 10 Marks]
