2023

M.Sc.

4th Semester Examination

ZOOLOGY

PAPER : ZOO-403A.1 & 403A.2

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks.

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

Illustrate the answers wherever necessary.

SECTION—I

(ZOO–403A.1)

(AQUACULTURE AND FISH TECHNOLOGY)

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

(a) Give an example of marine fish and crustacean species for aquaculture. 1+1=2

(b) Why is India considered the most emerging Asian country with regard to aquaculture development? 2

(c) What do you mean by 'carrying capacity' of a waterbody? 2

(d) What is the full form of MPEDA and when was it established and for what purpose? 1+1=2

2. Answer *any* **two** questions from the following : 4×2=8

(a) Name four bacterial diseases of finfish with symptoms of infection. 4

(b) What are the differences between wet 'bundh' and dry 'bundh'. 4

(c) Mention the different types of fishing crafts used in India. 4

(d) Write a short note on freezing techniques used in fish industries. 4

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

(a) Briefly describe the hypophysation technique. Write a short note on cryopreservation. 5+3=8

(b) What are the different types of integrated fish farming technique used frequently? Discuss its importance in view of natural resource management. 6+2=8

SECTION—II

(ZOO-403A.2)

(INLAND AND MARINE FISHERIES)

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

(a) Why is Chilika lake called a Lagoon? 2

(b) Comment on backwater fisheries at Kerala. 2

(c) How do you differentiate between domestic and industrial sewages in an urban area? 2

(d) Write a short note on larval stages of a shellfish. 2

5. Answer *any* **two** questions from the following : 4×2=8

(a) What is a reservoir? State the importance of reservoir management in India. 1+3=4

(b) An estuarine system can be classified by the salinity zone. Discuss. 4

(c) Why is sewage fed fish culture popular in rural areas of India? Comment on oxidation ponds. 3+1=4

(d) Write notes on the following : 1×4=4

(i) Fishes of coastal area

(ii) Pearl oyster

(iii) Public health fishery

(iv) Export production in aquaculture

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

(a) What is remote sensing system? Discuss the remote sensing process with the help of a word diagram. 2+6=8

(b) Write short notes on *any* **four** of the following : 2×4=8

(i) Biofertilizer

(ii) Trophic depression in a reservoir

(iii) Advances in aquaculture system

(iv) Marine resource

(v) 'CIFAX' and its use

(vi) Active sensor and passive sensor of RS-system

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ZOOLOGY

PAPER : ZOO-403B.1 & 403B.2

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Illustrate the answers wherever necessary.

SECTION—I

(ZOO-403B.1)

(SYSTEMS ECOLOGY)

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

(a) How is Ecological Economics different from Conventional Economics?

(b) Why is Ecorestoration considered as the ultimate acid test?

(c) What are the different patterns of spatial distribution?

(d) Write down the environmental responsibilities of an ecotourist.

2. Answer *any* **two** questions from the following : 4×2=8

(a) What are the four models of metapopulation?

(b) Elaborate the standards of Ecotourism.

(c) Represent the loss of ecosystem in respect of its structure and function. Explain the concept of patch and corridor in a landscape.

(d) Illustrate the Limnological zonations for a lake ecosystem. With examples, cite the major types of freshwater macrophytes.

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

(a) Describe the various categories of ecosystem services with appropriate examples. Compare tangible and intangible services. 6+2=8

(b) Write short notes on *any* **two** of the following : 4×2=8

(i) Thermal stratification
(ii) Deforestation and plantation
(iii) Turnover
(iv) Bray curtis index

SECTION—II

(ZOO-403B.2)

(HUMAN ECOLOGY)

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

(a) Enlist major global environmental issues.

(b) What is sustainable environmental management?

(c) Differentiate point pollution from non-point pollution.

(d) Add a note on the roles of 'Green Bench'.

5. Answer *any* **two** questions from the following : 4×2=8

(a) Briefly discuss the process of wasteland reclamation.

(b) Highlight scientific principles for integrated waste management.

(c) Explain the relationship among greenhouse gases, global warming and climate change.

(d) Elucidate roles of people's participation in biodiversity conservation.

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

(a) What is urbanization? What are the criteria for designating a place as to be an urbanized area? Briefly discuss the merits and demerits of urbanization on biodiversity. 1+3+4=8

(b) What is E.I.A? Mention different steps in the E.I.A. process. What are the criteria for the selection of plants in developing green belt? 1+4+3=8

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PAPER : ZOO-403C.1 & 403C.2

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SECTION—I

(ZOO-403C.1)

(GENETIC DISEASE AND MOLECULAR ANALYSIS)

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

(a) How do you add two different restriction sites at the ends of PCR product?

(b) What are the strategies for identification of positive colonies after transformation?

(c) How does SYBR –Green act as a probe in real-time PCR?

(d) What is chemiluminescence? How does it differ from bioluminescence?

2. Answer *any* **two** questions from the following : 4×2=8

(a) Illustrate the mechanism of TaqMan probe. State how it is different from Scorpion probe. 3+1=4

(b) Why not the genomic lac Z gene interfere with the detection during T-A cloning? In what ways TOPO cloning is different from T-A cloning. 2+2=4

(c) What is retroviral vectors? State the major difference between BAC and YAC. 2+2=4

(d) State the function of the following in a expression vector : 4

(i) HIS_6 tags

(ii) Enterokinase site

(iii) rbs

(iv) Lac operator

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

(a) (i) Illustrate the solid and liquid phase of pyrosequencing method.

(ii) Write a note on automated DNA sequencing. 5+3=8

(b) Describe the mechanism of formation of (i) extracellular senile plaques and (ii) neurofibrillary tangles are connected to the Alzheimer disease.

Illustrate your answer with proper diagram. 4+4=8

SECTION—II

(ZOO-403C.2)

(APPLIED GENETICS)

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

(a) What is the mechanism to switch in constant region from IgM to IgD?

(b) Why a V_H segment can not join directly with a J_H segment in heavy-chain gene rearrangement?

(c) In generating a B cell receptor gene, can V_K segments join to C_λ segment?

(d) Why have C_1,G sequences tended to disappear from the human genome?

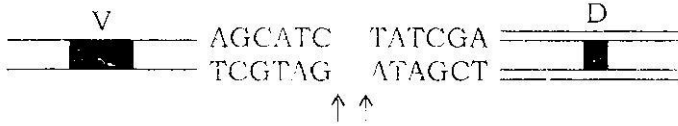
5. Answer *any* **two** questions from the following : 4×2=8

(a) *(i)* What kind of mutation gives rise to Huntington's disease?

(ii) What is the evidence that the gene identified as HD is really the gene that causes HD? 1+3=4

(b) Illustrate IgM synthesis process from the primary heavy-chain transcript in a B-cell. 4

(c) The following figure describes the end of a *V* region sequence and the beginning of the *D* region sequence to which is it about to be joined. Arrows mark the cleavage point where the RAG1/RAG2 complex will make the cut and recombination will be targeted



(i) Is this a heavy chain or a light chain sequence? How do you know?

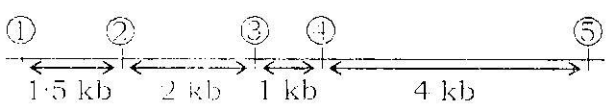
(ii) What DNA sequence structure would you find just downstream of the AGCATC sequence immediately adjacent to the 3' end of the *V* segment? 4

(d) Illustrate the location of 12-bp and 23-bp RSS spacers in TCR genes. 4

6. Answer *any* **one** question from the following : $8 \times 1 = 8$

(a) Give details of differential expression of the secreted and membrane bound forms immunoglobulin M chains of TCR regulated by alternative RNA processing.

(b) Here is the physical map of a region of DNA you are mapping by RFLP analysis.



The vertical lines with numbers at the bottom represent restriction sites for the enzyme Pst I. Sites (3) and (4) are polymorphic. The distances between Pst I sites are given. The extent of a probe you are using to detect the RFLP is indicated by a horizontal line at top. You cut DNA from different individuals with Pst I, electrophorese the fragments, blot them to a membrane and hybridize the blot to the labelled probe.

(i) Draw a picture of what the block will look like when the DNA comes from individual homzygons for the haplotypes.

HAPLOTYPE	Site 3	Site 4
A	Present	Present
B	Present	Absent
C	Absent	Present
D	Absent	Absent

(ii) What effect would presence or absence of site 1 have on the result?

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SECTION—I

(ZOO-403D.1)

(VECTOR BIOLOGY AND VECTOR BORNE PARASITES)

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

(a) What do you mean by Hemimetabolous and Holometabolous metamorphosis? Give examples.

(b) What do you mean by relapses and recrudescence in malaria?

(c) (i) What is pygidium?
(ii) What is flea index?

(d) (i) What are podosoma sand opisthosoma?
(ii) What is hypostome?

2. Answer *any* **two** questions from the following : 4×2=8

(a) Describe the morphological feature of flea. 4

(b) What is myiasis? Mention the major classification of myiasis. 1+3=4

(c) Distinguish between Ixodidae and Argasidae families of tick. 4

(d) What is relapsing fever? Describe the process of diagnosis and treatment of this disease. 2+2=4

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

(a) Describe the life cycle of black fly. Comment on the pathogenicity and clinical features of the disease caused by black fly. Add a note on its control. 4+2+2=8

(b) Write short notes on *any* **two** of the following : 4+4=8

(i) Control of tick and tick borne disease
(ii) Babesiosis
(iii) Maggot Debridement Therapy (MDT)
(iv) Pathogenesis of lymphatic filariasis

SECTION—II

(ZOO-403D.2)

(MOLECULAR DIAGNOSIS AND CLINICAL PARASITOLOGY)

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

(a) What do you mean by autoinfection and retrograde infection?

(b) What are tachyzoites and bradyzoites?

(c) Why are cells permeabilized during Immunofluorescence Assay (IFA)? Which reagent is used for cell permeabilization in IFA?

(d) Why are alkaline phosphatase and horseradish peroxidase enzymes most commonly used in ELISA?

5. Answer *any* **two** questions from the following : 4×2=8

(a) Write the principle of counter current immunoelectrophoresis. 4

(b) What is real time PCR? Mention one fluorescence dye commonly used in real time PCR. What is Ct value? Write few applications of real time PCR. 1+1+1+1=4

(c) Write the clinical features of hookworm anaemia. 4

(d) Describe the life cycle of *Toxoplasma sp.* 4

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

(a) Describe the life cycle, pathogenicity and prophylaxis of *Hymenolepis nana.* 5+2+1=8

(b) Write schematically the principle and procedure of complement fixation test and lateral flow immunoassay. 8

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