

2025

M.Sc. 3rd Semester Examination

ZOOLOGY

PAPER : ZOO-307A/B/C/D

Full Marks : 25

Time : One Hour

The figures in the margin indicate full marks.

Candidates are required to give their answers

in their own words as far as practicable.

ZOO-307A

(Fish Health Management)

Answer any *two* questions : $2 \times 2 = 4$

1. Why are kitchen ponds sensitive to different kinds of pathogens?
2. State the toxic effects of algal bloom on fish in culturable ponds.
3. Name any three commonly used antibiotics for bacterial diseases in aquaculture practices.
4. Mention two heavy metals that severely affect the fish brain and renal system, respectively.

Answer any *two* questions : $4 \times 2 = 8$

5. How does *Argulus* sp. affect the freshwater fish?

P.T.O.

6. Why are Cichlids very much resistant to natural incidental pathogenic effects?
7. State the aetiology of Epizootic Ulcerative Syndrome (EUS) of fish. Add a brief note on the application of CuSO_4 solution in fish health management. 3+1
8. Write short notes on : 2+2
- (i) Nutritional diseases of fishes
 - (ii) Fungal infections of fishes and its remedy

Answer any *one* question : $8 \times 1 = 8$

9. How do antibiotics affect the fish tissue system in natural habitats? State the functions of the following in fish disease management :
- (i) KMnO_4
 - (ii) CIFAX 6+1+1
10. Write notes on (any *four*) : $2 \times 4 = 8$
- (i) Marine toxicants
 - (ii) Biomagnification
 - (iii) Vaccine-based management in Asia's aquaculture
 - (iv) Fish Blood Parasites
 - (v) Haematological test for blood parasite identification in fish.

Internal Assessment : 5 marks

(3)

ZOO-307B

(Aquatic Ecology)

Answer any *two* questions : $2 \times 2 = 4$

1. State the unique features of an estuary. Provide two examples of estuarine fauna.
2. With suitable illustration, represent the difference between bottom-up and top-down control.
3. Outline the relationship between surface water and groundwater.
4. Define capillary water and mention its significance.

Answer any *two* questions : $4 \times 2 = 8$

5. Define and categorize wetlands.
6. How can waste water be utilized as a resource?
7. "Estuary is a dynamic ecosystem" — explain.
8. Enumerate the features of mangroves. Cite examples of mangrove dwelling fauna. How do they thrive in saline environment? $2+1+1$

Answer any *one* question : $8 \times 1 = 8$

9. (i) Elucidate the role of plankton in aquatic food chain. Comment on the common types of phytoplankton in aquatic ecosystem.

P.T.O.

(4)

- (ii) Elaborate the niche requirements of hermatypic corals. Depict the interaction between zooxanthellae and coral reefs. (2+2)+(1+1+2)

10. Write short notes on any *two* of the following : $4 \times 2 = 8$

- (i) Aquifer and its ecological significance
- (ii) Bioremediation using freshwater molluscs
- (iii) Necton, neuston and benthos
- (iv) Pond zonation and nutrient cycling

Internal Assessment : 5 marks

(5)

ZOO-307C

(Molecular Biology)

Answer any *two* questions : $2 \times 2 = 4$

1. State the major function of the TGF- β pathway in cell regulation.
2. What role does the Notch-Delta pathway play in cell differentiation?
3. What is LINE-1 (L1) and why is it important in humans?
4. Describe in brief the strategies for transposon excision.

Answer any *two* questions : $4 \times 2 = 8$

5. How is I κ B α phosphorylated, ubiquitinated, and degraded? How does free NF- κ B translocate into the nucleus? What co-factors assist in NF- κ B-mediated transcription? $1+2+1$
6. Describe the principles and strategies behind *ex vivo* and *in vivo* gene therapy.
7. What changes occur when Hedgehog binds PTCH? How does SMO activation regulate GLI transcription factors? What are the nuclear effects of activated GLI proteins on gene expression? $1+2+1$
8. How are R-SMADs phosphorylated, and what is the role of Co-SMAD? How does the SMAD complex enter the nucleus and regulate target gene transcription? $1+1+2$

P.T.O.

(6)

Answer any *one* question : $8 \times 1 = 8$

9. What are Wnt ligands, and how are they secreted and modified? How does Wnt binding to Frizzled and LRP5/6 inhibit β -catenin degradation? How do activated STAT dimers regulate transcription in the nucleus? $2+3+3$
10. How do LTR and non-LTR retrotransposons differ in organization and replication? How does target-primed reverse transcription (TPRT) occur? $4+4$

Internal Assessment : 5 marks

(7)

ZOO-307D

(Immunoparasitology)

Answer any *two* questions : $2 \times 2 = 4$

1. Write the chemicals used for —

(i) fixation of antigen and

(ii) permeabilization of cells during immunofluorescence assay.

2. What is β -Selection that occurs in DN Thymocytes?

3. Mention the TLRs that recognize lipopolysaccharide and unmethylated CpG dinucleotides, respectively. Which family of soluble Pattern Recognition Receptors (PRRs) can detect the presence of viral RNA in the cytosol?

1+1

4. Write a short note on central tolerance.

Answer any *two* questions : $4 \times 2 = 8$

5. Describe the mechanism of Type I hypersensitivity with a proper diagram.

6. How do adaptor proteins like MyD88 initiate downstream signalling? How does TLR signaling coordinate innate and adaptive immune responses?

2+2

7. Use a table to outline the receptor expression patterns, their locations, and key events in double-negative thymocyte development.

P.T.O.

8. What types of mutant myeloma cells are used for making hybridoma? How are hybridoma cells selected after fusion of immunized spleen B-cells with myeloma cells? 1+3

Answer any *one* question : $8 \times 1 = 8$

9. Describe the factors (transcription factors, DNA methylases, and miRNA) regulating B-cell development. Discuss the roles of IL-7 signalling in early lymphocyte development. What is the pre-B-cell (first) checkpoint in B-cell development? 3+2+3
10. How do T Cells Undergo Positive and Negative Selection? Explain the relationship between TCR affinity and selection. 6+2

Internal Assessment : 5 marks
