PG/IIIS/ZOO/303(A_1,A_2,B_1,B_2, C_1,C_2,D_1,D_2)/23

M.Sc. 3rd Semester Examination 2023

ZOOLOGY

(Special Paper)

PAPER – ZOO-303

Full Marks : 50

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

(Fishery Special)

PAPER – ZOO-303 A1

(*Fish Taxonomy, Anatomy and Biology*)

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

(*a*) How do you identify a fish in the order– Clupeiformes with an example ? 2

(*b*) Mention the life stages of a shellfish. 2

(*c*) State the functional parts, (Histological structures) of an Air bladder within physostomous type of fish specimen. 2

(*d*) Write a note on : Scales in fishes. 2

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

(*a*) How do you classify planktons on the basis of their size ? 4

(*b*) Describe the process of life fish food production in a culturable water body of your locality. 4

(*c*) Mention the excretory products of a marine fish. How the excretory structures regulate their functional homeostasis in the marine environments ? $1 + 3$

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

(*i*) Head kidney.

(*ii*) Cyclomorphosis.

(*iii*) Pearson model used in fish food preparation.

(*iv*) Bionomics of fish.

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

(*a*) Describe the endocrine regulation of fish reproduction. 8

(*b*) Write the following answers : 2×4

(*i*) Alimentary canal of a Carnivorous fish.

(*ii*) Write a note on : Feeding intensity of fish.

(*iii*) Function of 'Weberian Ossicles' in Order-Cypriniformes fishes.

(*iv*) Describe the major body parts which are responsible for temperature regulation in fish.

PAPER — ZOO-303 A2

(*Fish Health and Management*)

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

(*a*) How do you determine the stress of an aquatic system ? 2

(*b*) Which organs are very much responsible for parasitic infection of fish ? 2

(*c*) Mention the various piscine pathogenic agents of fish diseases. 2

(*d*) Write a note on Algal Bloom. 2

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

(*a*) Discuss the peculiarities of a lymphohaemopoietic organ in fish. 4

(*b*) How do you isolate the DNA from a protozoan parasite of fish ? 4

(*c*) State the application of Probiotics in fish farming system. 4

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

(*i*) Infectious Haematopoietic Necrosis (IHN) in fish.

(*ii*) *Branchiomycosis* (Gill rot).

(*iii*) Fish disease cause by Crustaceans parasite.

(*iv*) Abdominal Dropsy in fish.

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

(*a*) Describe the etiology of EUS-infected fish in your locality and focus on its management strategies for the survivability of life stock. 3 + 5

(*b*) Write notes on : 2×4

(*i*) Macrophages in fish haemopoietic organs.

(*ii*) Malnutrition in fish.

(*iii*) Antibiotics used in Aquaculture system.

(*iv*) Nonspecific defence mechanism in fish.

[Internal Assessment – 10 Marks]

(Ecology Special)

PAPER – ZOO-303 B1

(*Biodiversity and Conservation Ecology*)

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

(*a*) How to decide which wildlife to be protected ?

(*b*) Draw the relationship between Biodiversity and ecosystem stability.

(*c*) Enlist the Objectives of Joint Forest Management.

(*d*) Name the IBAs of West Bengal.

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

(*a*) State the various causes of extinction vis a vis threats to Biodiversity.

(*b*) What are the common parts involved in Wildlife Crime ? Which animals are commonly illegal to kill or smuggle ?

(*c*) State the top-down approach of wildlife management. Differentiate belt transect method from line transect method. $2 + 2$

(*d*) Mention the objectives of Wildlife Protection Act of India, 1972.

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

(*a*) (*i*) State the demerits of ex-situ conservation. 4

(*ii*) Define EBA. Tabulate the status of Endemic birds in India. 1 + 3

(*b*) Write short notes on any *two* : 4 × 2

(*i*) Captive breeding

(*ii*) Geography of IUCN Red list

(*iii*) Sustainable Development Goals

(*iv*) Indirect values of biodiversity.

PAPER — ZOO-303 B2

(*Aquatic Ecology*)

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

(*a*) Comment on Coral Bleaching.

(*b*) Define Bioremediation.

(*c*) Distinguish between nekton & benthos.

(*d*) How do you measure the specific yield of an Aquifer ?

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

(*a*) Illustrate the variety of aquatic biota present in freshwater ecosystem.

(*b*) Enlist the features of ICZM. Mention the chemical composition of sea waters. $2 + 2$

(*c*) What are the of contribution of a mangrove ? Why is the ecosystem of the Sundarbans facing a serious threat ?

(*d*) Mention two major conservation strategies for restoring floodplain eco-system.

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

(*a*) (*i*) Compare among Lacustrine, Palustrine and Riparian ecosystems.

(*ii*) Classify Indian Coastal Zone, mentioning their zonations. $4 + 4$

(*b*) Write short notes on any *four* : 2×4

(*i*) Types of Hermatypic corals

(*ii*) Periphyton

(*iii*) Sewage

(*iv*) Continental margin

(*v*) Types of estuaries based on geomorphology

(*vi*) Zooplankton's role.

[Internal Assessment – 10 Marks]

(Genetics & Molecular Biology Special)

PAPER – ZOO-303 C1

(*Generic & Molecular Biology*)

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

(*a*) What is the significance of R looping experiment ?

(*b*) What is Snurps ?

(*c*) Write the consensus sequences at exon-intron boundaries in yeast mRNA precursor.

(*d*) What is the fate of a transgenic xx mice that lack wnt 4 gene ?

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

(*a*) Describe briefly the proapoptotic function of BH-3 only protein.

(*b*) State briefly the summary of wnt 4/β catenin loop specifying mammalian ovary development.

(*c*) State summary of U5-U6 interactions revealed by 4 thio-U controlling in nuclear in RNA splicing.

(*d*) How chromatin remodelling is involved in regulating transcriptional activity in Dosage compensation in Drosophila.

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

(*a*) Illustrate the yeast spliceosome cycle with diagram.

(*b*) How does cytochrome c trigger and activate caspase I for apoptosis ?

PAPER — ZOO-303 C2

(*Molecular Biology*)

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

(*a*) Transposases share a common catalytic domain–Explain.

(*b*) What feature of Delta ensures that only neighboring cells are signaled ?

(*c*) What modifications to Hedgehog enable it to be membrane bound ?

(*d*) What is cancer immunoediting ?

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

(*a*) What are the principal steps in cancer metastasis ? State the role of adhesion molecules during the process. 2 + 2

(*b*) Illustrate the mechanism of transposition via target-primed reverse transcription.

(*c*) Explain, why the loss of function *hedgehog* and *smoothened* mutations yield the same phenotype in flies, but a loss of function *patched* mutation yields the opposite phenotype–Explain with diagram. 4

(*d*) (*i*) Why is the signaling pathway that activate NF-Kβ considered to be

relatively irreversible compared with cytokine or RTK signaling pathway ?

(*ii*) How is the NF-Kβ signalling pathway turned off ? 2 + 2

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

(*a*) (*i*) What are the cascades of events during tumor angiogenesis ? Name the principal growth factors and corosponding receptors during the process.

(*ii*) Explain the mechanisms for terminating cytokine signal transduction by EpoR. 2 + 2 + 4

(*b*) (*i*) How does transposition can be controlled through target site selection ?

(*ii*) State the role of MMPs in proteolysis and invasion of tumor dissemination.

(*iii*) Describe the mechanism of TGF-β latency and activation with proper diagram. 2 + 2 + 4

[Internal Assessment – 10 Marks]

(Parasitology Special)

PAPER – ZOO-303 D1

(*Diversity and Biology of Parasite*)

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

(*a*) Define phoresis with example. Write the name of first, second and third larval stage of *D. Latum*.

(*b*) What is calabar swelling ?

(*c*) Explain sparganosis.

(*d*) What is Epizootic Ulcerative Syndrome (EUS) ?

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

(*a*) What is Pseudoscolex ? Draw the structure of scolices of order cathetocephalideans. Mention its structural peculiarities. 1 + 1 + 2

(*b*) What do you mean by periodicity ? Write a note on periodicity of microfilariae of *Loa loa*. 1 + 3

(*c*) Describe the structure of Apical complex with labelled diagram. 2 + 2

(*d*) What is the causative agent of Black spot disease ? Write the symptom and treatment of it. 1 + 3

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

(*a*) Discuss in brief the life cycle, pathogenecity and prophylaxis of *Echinococcus granulosus*. 5 + 2 + 1

(*b*) (*i*) Write the general characters of cyclophyllidean cestode.

(*ii*) Mention the name and functions of different glands found in cercaria of blood fluke. 3 + 5

PAPER – ZOO-303 D2

(*Immunoparasitology*)

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

(*a*) What is Real time PCR ? Explain Ct value. 1 + 1

(*b*) Do positive and negative selection occur at the same stage of development or in sequence ?

(*c*) What is the significance of endosomal TLRs ?

(*d*) How does histamine suppress its own release ?

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

(*a*) A mother has an Rh^- and the father an Rh^+ blood type. The first baby born to the parents was Rh^+. However, the parents elect for the mother not to receive Rhogam. Are all future babies of this couple at risk for type II hypersensitivity reactions ? Explain your answer. $1 + 3$

(*b*) There are few mouse strains, each of which lacks a specific gene. How might the type-I hypersensitivity response of each knockout strain differ from wild type mouse ? $2 + 2$

(*i*) Mouse is unable to generate a high-affinity $Fc\epsilon RI$ receptor.

(*ii*) Mouse is unable to generate a ϵ heavy chain.

(*c*) Explain and draw relationship between TCR affinity and selection during T-cell development. 4

(*d*) Match the following : 4

Group-A	Group-B
(A) TLR7	(i) Triacyl lipopeptides
(B) TLR2	(ii) CpG containing DNA
(C) TLR1	(iii) ss RNA
(D) TLR9	(iv) LPS
(E) TLR4	(v) ds RNA
(F) TLR3	(vi) Peptidoglycan

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

(*a*) (*i*) Write the principle of immunofluorence.

(*ii*) Describe in brief the procedure for production of monoclonal antibody.

(*iii*) Illustrate the signalling pathway after cross linking of nucleic acids with respective endosomal TLRs. 2 + 3 + 3

(*b*) (*i*) Describe the phenotypic markers from DN1 to DN4 in thymocytes.

(*ii*) Illustrate the mechanism of positive and negative selection in T-cell development. 2 + 6

[Internal Assessment — 10 Marks]
