 PG/IIIS/ZOO/303(A_1,A_2,B_1,B_2, C_1,C_2 & D_1,D_2)/24

PG 3rd Semester Examination, 2024

ZOOLOGY

PAPER – ZOO-303(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

Illustrate the answers wherever necessary

PAPER : ZOO-303A.1

Fishery Special : (*Fish Taxonomy, Anatomy and Biology*)

GROUP – A

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

(*a*) How you identify a fish species on the basis of their morphometric characters ?

(*b*) Why Cyclomorphosis is a significant feature of planktonic life ?

(*c*) Mention the name of four enzymes within the alimentary tract responsible for the digestion of micronutrients in feed.

(*d*) Write a note on : Ultimobranchial Gland.

GROUP – B

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

(*a*) Discuss the role of pigments in fish coloration.

(*b*) State the structure and functional distinctions of 'Corpuscles of Stannius' in Bony fish.

(*c*) What is meant by Osmoregulation in fish and why osmosis is considered important ? 2 + 2

(*d*) Discuss how the Bony fish (consider Cyprinids only, for example) carry out the process of food digestion and nutrient absorption in the first few days of their life.

GROUP – C

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

(*a*) Briefly discuss the steps followed for determination of protein requirement of a fish species. What are the extrinsic and intrinsic factors on which nutrient requirement depend ? 4 + 4

(*b*) Elaborate the structural integrity of a endocrine gland in fish and state its functions in fish culture systems. 6 + 2

PAPER : ZOO-303A.2

Fishery Special : (*Fish health Management*)

GROUP – A

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

   (*a*) What is algal toxicosis in fish ?

   (*b*) Name two non-infectious diseases in aquaculture.

   (*c*) How do you treat ammonia poisoning in fish culture pond ?

   (*d*) Mention one method to diagnose Protozoan infections.

GROUP – B

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

   (*a*) Discuss the symptoms and treatment of gill disease in fish.

(*b*) How do myxosporidian parasites affect fish populations ?

(*c*) Do you support prophylactic application of antibiotics in aquaculture ? Justify your answer with reasons. 3 + 1

(*d*) Explain the role of probiotics in enhancing fish health.

GROUP – C

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

(*a*) Explain the management strategies for fish disease related to environmental stress.

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

(*i*) Algal Bloom

(*ii*) Trichomoniasis

(*iii*) Epizootic granulomatous aphanomycosis

(*iv*) Myxosporidian parasites

(*v*) Major lymphoid organs in fish

(*vi*) *Argulus* sp.

[Internal Assessment – 10 Marks]

PAPER : ZOO-303B.1

Ecology Special : (*Biodiversity and Conservation Ecology*)

GROUP – A

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

   (*a*) How many Biodiversity Hot spots are there in the world ? Name Hot spots of India. $\frac{1}{2} + 1\frac{1}{2}$

   (*b*) Why is scientific stakeholder analysis necessary for implementing Forest laws ?

(*c*) Name the major hubs for wildlife trafficking in India. What is CAMPA ? 1 + 1

(*d*) Write a note on the utilitarian and non-utilitarian values of Biodiversity.

GROUP – B

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

(*a*) State the objectives of CBD. Add a note on the 'conference of parties' (COP). What are the benefits of JFM ? 2+1+1

(*b*) Enlist IUCN Red List categories of version 3.1. A species has undergone 50% decline in past 10 years and has 50% probability of extinction within next 10 years. Mention the Red List category to which it belongs. 3 + 1

(*c*) What are the three appendices of CITES ? State the benefits of CITES ? 2 + 2

(*d*) What is the so called SLOSS Debate ? Describe structure of a typical Biosphere Reserve as envisaged by IUCN. 1 + 3

GROUP – C

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

(*a*) Enlist the Criteria of endemism. How many EBAs are present in India ? Name few endangered birds of each category. How is IBA different from EBA ? 2+1+4+1

(*b*) On what basis a species is classified as Critically Endengered (CR) ? Name four mammals under Red list found in West Bengal. Enlist atleast four megadiverse countries of the Indo-Pacific region. 4+2+2

PAPER : ZOO-303B.2

Ecology Special : (*Aquatic Ecology*)

GROUP – A

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

(*a*) Jot down the Hydrogeomorphic classification of wetlands. On which principle is it based on ?

(*b*) Illustrate marine zonation with suitable diagram.

(*c*) What do you mean by Ramsar site ?

(*d*) Schematically represent various benthic communities in a pond ecosystem.

GROUP – B

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

(*a*) Describe the various re-uses of waste water. List the sequential stages of Sewage sludge treatment.

(*b*) Classify estuary according to geomorphology with suitable diagram.

(*c*) What are the benefits of aquatic macrophytes ? Classify macrophytes based on their nature with examples. 2 + 2

(*d*) Coral reefs are offen called "rainforest of the sea"–Explain why. Comment on Coral Bleaching. 3 + 1

GROUP – C

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

(*a*) (*i*) Elaborate the various wetland categories. 4

(*ii*) Why is mangrove considered the most productive ecosystem ? State the factors influencing the mangroves. Enlist the numerous ecological contributions of mangroves. 1 + 1 + 2

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

(*i*) Importance of coast line

(*ii*) Pleuston and Plankton

(*iii*) Social significance of river

(*iv*) Conservation strategies of aquatic life

(*v*) Continental shelf

(*vi*) Identifying features of Cladocera.

[Internal Assessment — 10 Marks]

PAPER : ZOO-303C.1

Special Paper : (*Genetics*)

GROUP – A

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

(*a*) What is an epigenetic phenomenon ? Cite one example.

(*b*) Suppose a mutation occured in the SRY gene on human Y-chromosome, knocking out its ability to produce the testis-determining factor. Predict the phenotype of an individual who carried this mutation and a normal X-chromosome.

(*c*) Draw an interaction site between a yeast 5'splice site and U6 Sn RNA.

(*d*) The TRA protein targets the dsx pre-mRNA for alternative splicing. However if TRA is not present, male differentiation ensues. Why then do animals with knock-out mutations in dsx have both male and female characteristics ?

GROUP – B

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

(*a*) Explain the crucial role of CTD in mRNA splicing. Name one experiment which supports for the hypothesis that the CTD plays a role in exon definition.

(*b*) What are the three steps involved in X-inactivation in mammal (human) ?

(*c*) Describe the proapoptotic functions of 'BH3 only' Bcl 2 proteins with proper diagram.

(*d*) State the role of splicing factor Slu7 and SC 35 in the splicing event of human β globin pre-mRNA.

GROUP – C

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

(*a*) (*i*) Describe the event of programmed cell death which proceeds by apoptosis

in *Drosophila melanogaster* with the help of a schematic pathway.

(*ii*) What are the genes that are important in clearence of apoptotic cells in C. elegans ?

(*b*) (*i*) The SXL protein binds to its own mRNA as well as the mRNA of tra and msl 2. How does it regulate its own expression through mRNA binding ? Is this mechanism the same as or different from the mechanism by which it regulates the expression of tra and msl 2 ?

(*ii*) A tra mutant has a non sense mutation in exon2. What phenotype do you expect this mutant to have in animals with an X : A ratio of 1 : 2 ? In animals with an X : A ration of 2:2 ?

PAPER : ZOO-303C.2

Special Paper : (*Molecular Biology*)

GROUP – A

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

(*a*) What is Hayflick limit ?

(*b*) What is drug repurposing ?

(*c*) Which protein of notch protein is involved in transcriptional regulation ?

(*d*) Which TLRs are involved in recognition of LPs, ssRNA and methylated DNA ?

GROUP – B

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

(*a*) How metastasis is triggered ? How does differential expression of genes influence the 'seed and soil theory' ? 1 + 3

(*b*) What are the proteins involved in Myddosome or Triffosome ? How are they formed ? 2 + 2

(*c*) What are the main causes of Tumor recurrence which is a major carcat in the prognosis of cancer patients ? How can you eradicate them ? 2 + 2

(*d*) What is the role of NEMO in NF-K3 signalling ? Mention the role of Rel A(p65) in NF-KB signalling. 2 + 2

GROUP – C

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

(*a*) (*i*) How would you treat hormonal cancer versus virus induced tumors ? Explain the rationale.

(*ii*) What are characteristics of the causal agent/factor for tumor recurrence in cancer patients ? 5 + 3

(*b*) (*i*) Define the role of g-secretase in notch-delta signaling.

(*ii*) Define the role of SMAD4 in TGF6 signaling.

(*iii*) Illustrate the mechanism of active TGF6 formation from pro TGF beta with a schematic diagram. $1\frac{1}{2}+1\frac{1}{2}+5$

[Internal Assessment — 10 Marks]

PAPER : ZOO-303D.1

(*Diversity and Biology of Parasite*)

GROUP – A

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

(*a*) (*i*) What is calabar swelling ?

(*ii*) What are reservoir host ?

(*b*) What is ligulosis ?

(*c*) What is hydatid cyst ?

(*d*) Write the functional significance of the following :

(*i*) Rhoptries

(*ii*) Micropore

(*iii*) Subpellicular microtubules.

GROUP – B

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

(*a*) Write the transmission, symptoms and treatment of Primary Amoebic Meningo-encephalitis (PAM).

(*b*) What is the causative agent of Gill Rot disease ? Mention its effect on host. Comment on its control measures. 1+2+1

(*c*) Enumerate the structure and function of Trematode cuticle with suitable diagram.

(*d*) What are metastatic lesion in *Entamoeba* infection ? State the important virulence factors of *E histolytica* infection. What is amoebic trogocytoisis ?

GROUP – C

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

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

(*b*) Write down the mechanism of protein metabolism in *Ascaris lumbricoides*. How does habitat alteration have the major impact on the epizootiology of *Myxobolus cerebralis* ? 5 + 3

PAPER : ZOO-303D.2

(*Immunoparasitology*)

GROUP – A

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

(*a*) What is western blotting ? Which substrates are used for alkaline phosphatase conjugate antibody to detect immunoreactive proteins in western blot ? 1 + 1

(*b*) How will you confirm amplification of desired DNA by PCR ? What is Real time PCR ? 1 + 1

(*c*) What are vasodilators ? Give an example.

(*d*) What do you understand by delayed-type hypersensitivity ?

GROUP – B

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

(*a*) Describe briefly with a suitable diagram the development of CD4 and CD8 T-cells in thymus from bone marrow stem cells mentioning the gradual expression of different T cell receptor and co-receptor genes.

(*b*) What is Chimeric Antigen Receptor (CAR) ? How CAR-T cells are used in cancer therapy ? 2 + 2

(*c*) Describe schematically with a suitable diagram the mechanism of VDJ recombination in immunoglobulin heavy chain gene rearrangement. Why V segments of Ig heavy chain gene cannot join directly with J segment ? 3 + 1

(*d*) What are the roles played by costimulatory molecules in inducing immune tolerance ? What do you understand by anergy ? 2 + 2

GROUP – C

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

(*a*) Distinguish between polyclonal and monoclonal antibody. How antibody secreting hybridoma cells are selected after fusion of myeloma cells with immunized spleen cells ? 2 + 6

(*b*) Describe the mechanism of immune tolerance involved in T-cells at Central and peripheral levels. What are the pathological hallmarks of SLE and myasthenia gravis ? 6 + 2

[Internal Assessment – 10 Marks]