M.Sc.

2018

4th Semester Examination

ZOOLOGY

PAPER—ZOO-403

Subject Code—35

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Answer *all* questions.

(SPECIAL : FISHERY)

Group–A

(*Aquaculture and Fish Technology*)

1. Answer any *two* questions: 2×2

(a) What do you mean by Post harvest activity and state its importance.

(b) Principles of fish marketing with Export and Import to foreign countries.

(c) Distinguish between selective and natural breeding of fish.

(d) What are cryoprotectants ? Give examples.

2. Answer any *two* questions : 2×4

(a) Advantages of Agri-Aquaculture system and farming type.

(b) What is 'Oxidativer rancidity' ? Add a brief note on 'Salt curing' for preservation of fish.

(c) Hypophysation and its importance in Aquaculture.

(d) Give a brief account on the role of fisheries extension in rural development.

3. Answer any *one* question : 1×8

(a) Discuss in details on the fish by-products and different methods of preparation.

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

Eurohypophysis, Bandbreeding, Algol brooming, Aquatic weeds, Synthetic Harmonics, EUS.

Group — B

(*Inland and Marine Fisheries*)

4. Answer any *two* questions : 2×2

(a) Define Reservoir. Mention two names reservoirs in West Bengal. 1+1

(b) Mention the emerging trends of polyculture in India. 2

(c) What is Blackwater fishery ? Cite examples. 2

(d) Write note on : Aquatic biofertilizar. 2

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

(a) How can you differentiate the "Domestic and Indistrial Sewage" in our locality ? Note one: A City Sewage. 2+2

(b) Mention how Remote Sensing system works in nature. State its importance in nature. 3+1

(c) Discuss about various steps usually adopted in the development of Indian reservoir system. 4

(d) Why public health fishery is important for community succession ? Write a note on: Fish sanctuary. 3+1

6. Answer any *one* question : 1×8

(a) Explain the necessary treatment of sewage for fish culture. How waste stabilization pond system

modulate the agriculture sector in a planned manner ? Write a note on oxidation pond.

4+2½+1½

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

(i) Culture based capture fishery

(ii) Fish migration

(iii) Use of RS-GIS in Aquaculture

(iv) Reservoir Fishes

(v) Larvivivorus fish

(vi) Pen culture.

(SPECIAL : Genetics and Molecular Biology)

Group — A

(Recombinant DNA and Molecular Analysis)

1. Answer any *two* questions : 2×2

(a) Compare Taq and Pfu polymerase. Which one is more useful for sequencing reaction ?

(b) How does ethidium bromide interact with DNA and how does it help in visualizing DNA on an agarose gel ?

(c) State the principle of DNA-foot printing.

(d) Write a short note on (any *one*)

(i) Promoter escape

(ii) RFLP

2. Answer any *two* questions : 2×4

(a) Heptocyte cells during inflammation secrect IL-8 which was measured by ELISA. IL-8 gene's promoter has three trsncription factors—

AP-1, NF-IL-6 and NF Kappa B.

Design an experimental procedure to find the activated transcription factor responsible for IL-8 transcriptional upregulation. 4

(b) State the principle of pyrosequencing and state its advantages over traditional Sanger method. 3+1

(c) What do you mean by 'terminal transferase' activity of 'Taq polymerase' ? How do you utilize these property in cloning of a Prokaryotic gene. 2+2

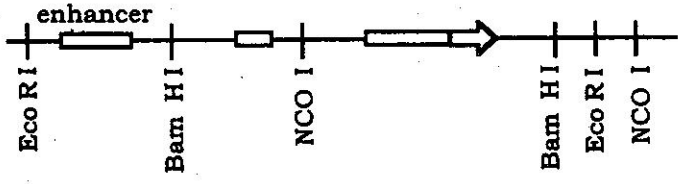
(d) Illustrate how does RNA molecules be hybridized and detected through Northern Blotting. 4

3. Answer any *one* question : 1×8

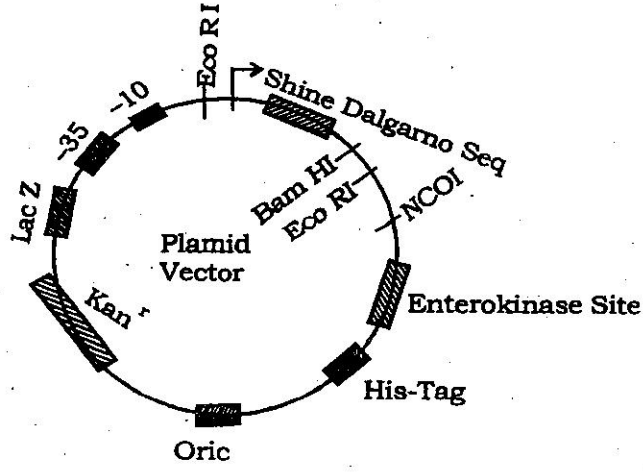
(a) (i) Illustrate the properties of Prokaryotic and Eukaryotic expression vectors.

(ii) State the properties of fluorescent probes used in real time PCR with example. 5+3

(b) The diagram below represents a section of the human genome. The coding sequence of a YFG, is shown by an arrow, and boxes indicate the location of some regulatory sequences.



To clone this in *E. Coli* for investigation in the expression vector shown below :



(i) What is the significance of the Lac Z gene in a Plasmid vector ?

(ii) What restriction enzyme would you use to clone this gene ? Explain your choice.

(iii) State the importance of His-Tag in expression vector.

(iv) What is the use of enterokinase and Shine-Dalgarno sequence in expression vector.

2+2+2+2

Group — B

(*Applied Genetics*)

4. Answer any *two* questions : 2×2

(a) What are the essential elements of a YAC vector ?

(b) What kind of mutation give rise to Huntington disease ? What is the evidence that the gene identified as HD is really the gene that causes HD ?

(c) What are the three different sources of antibody variability ?

(d) Write a note on CPG island.

5. Answer any *two* questions : 2×4

(a) You are mapping a gene that causes a 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 fo 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 and 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	+

(b) Describe briefly the genetic control of human antibody lambda light chain.

(c) What are the mechanisms involved in the generation of vast array of antibody diversity ?

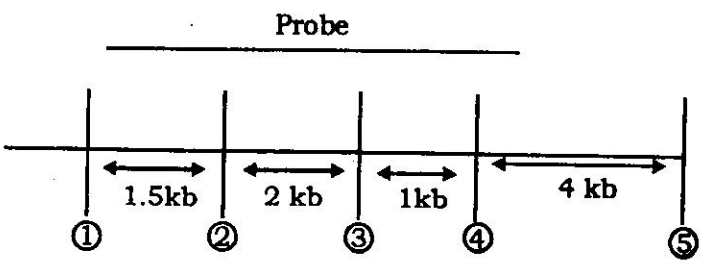
(d) What major conclusions can we draw from the sequence of human chromosome 21 ?

6. Answer any *one* question : 1×8

(a) (i) What is class-switching and how does it involve in the rearrangement of V(H) exon.

(ii) State the function of V(D)J recombinase. (1+4)+3

(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 extent of a probe 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 blot will lock like when DNA comes from individual homozygous for the following haplotypes : 6+2

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. 6+2

(SPECIAL : ECOLOGY)

Group — A

(*Systems & Molecular Ecology*)

1. Answer any *two* questions : 2×2

   (a) State the primary ecological differences between Tropical and temperate forests.

   (b) How many indices of disperion are used for analysing spatial distribution ?

   (c) Name the four paradigms for Metacommunity theory.

   (d) State the functional significance of keystone species in ecological community.

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

   (a) Elaborate the responsibilities of Government and Ecotourists in tune with ecotourism. Enlist the diverse ecotourism resources of India. 1+1+2

   (b) Present the model of metapopulation dynamics. Define and explain the concept of Metacommunity. 2+2

   (c) Explain the term 'Thermocline' with figure Highlight the significance of thermal stratification in freshwater lakes. 2+2

   (d) Illustrate the different landscape states defined by the degree of habitat destruction. 4

3. Answer any *one* questions : 8×1

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

(i) Plantation Vs. Wasteland

(ii) Species turnover

(iii) Organismic Vs. Individualistic concepts of communities.

(iv) Enhancement Vs. Remediation

(v) Scheme of Ecological view of damage

(vi) Major constraints faced in Ecorestorations

(vii) DNA fingerprinting and its utility in wildlife conservation.

(b) Outline the principles of Ecotourism in true with sustainable development.

(i) What are the 3 major adverse impacts of Tourism as compared to Ecotourism ? Name any 2 successful Ecotourism destinations in India. 1½+1½+1

(ii) Calculate the species rechness (S), Shannon Wiener Index ($\bar{H}$) and Pielou's indices (e) of both communities given in the table below, and comment on the results : 1×4

Species	*Community A*	*Community B*
I	5	8
II	3	6
III	0	4
IV	11	2
V	2	0

Group — B

(*Human Ecology*)

4. Answer any *two* questions : 2×2

(a) Enlist different types of Sustainable Development.

(b) Differentiate between rapid EIA and comprehensive EIA.

(c) Elnist common indoor pollutants.

(d) Explain the criteria for a place to be considered as urban area.

5. Answer any *two* questions : 2×4

(a) Classify different types of biofertilizers with examples.

(b) Briefly discuss the integrated mechanism of solid waste management.

(c) Discuss the mitigation strategy of global warming.

(d) Briefly discuss different factors leading to soil erosion.

6. Answer *one* question : 1×8

(a) Mention two articles in Indian constitution which are related to environmental protection. Briefly describe the impact of global warming on aquatic biodiversity.

(d) Discuss the impact of urbanization on biodiversity. What are the criteria for developing Green Belt around industry. 4+4

(SPECIAL : PARASITOLOGY)

Group — A

(*Vector Biology and Vector borne Parasites*)

1. Answer any *two* questions : 2×2

(a) What is Myiasis ? Give example.

(b) What do you mean by primary kinetes and cytomeres ?

(c) What is PKDL ?

(d) What do you mean by Transbovarian transmission ? Give example.

2. Answer any *two* questions : 2×4

(a) What is cerebral malaria ? Mention its causative agent and add a note on its pathogenecity. 1½+2½

(b) Explain the impact of climatic change on Vector borne disease (VBD's). 4

(c) Write the symptoms of the disease cuased by blackfly. Mention its diagnosis method. 2+2

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

3. Answer any *one* question : 1×8

(a) Describe briefly the biology of *Babesia* sp. Write the diagnostic method and prophylaxis of Babesiosis. 4+2+2

(b) (i) What do you mean by Stable and unstable malaria ?

(ii) Describe the role of Sporozoite and Merozoite in the life cycle of *Plasmodium*. What is a hypnozoite. 4+3+1

Group — B

(*Molecular Parasitology and Epidemiology*)

4. Answer any *two* questions : 2×2

(a) Why real time PCR is preferred over routine PCR ?

(b) What do you mean by therapeutic Parasite ? Write the scientific name of two helminths used as therapeutic Parasite.

(c) Write a note on VSG coat.

(d) What do you mean by Land Scape epidemiology ?

5. Answer any *two* questions : 2×4

(a) Why *ELISA* is preferred over RIA in detection of Parasitic infection ?

(b) What do you mean by primer primer dimer and how it interferes the outcome of PCR ?

(c) Describe the mechanism of class switching of VSG gene and its significance in trypanosomes.

(d) Write the criteria for using helminth as therapeutic agent.

6. Answer any *one* question : 1×8

(a) (i) What do you mean by marker molecule in immunodiagnosis of endoparasite and write its features.

(ii) Write the principle of detection of endoparasite infection on the basis of such marker molecule. 1½+1½+5

(b) (i) Define epidemiology. Write a note on epidemiology of malaria.

(ii) What is DNA hybridization Probe ? 1+5+2
