2008

ZOOLOGY

PAPER—IX (Group—A)

Full Marks : 50

Time : 2 hours

Answer any **four** questions, taking **two** from each Unit

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

FISHERY SPECIAL

UNIT—I

(*Fish Taxonomy and Biology*)

1. (*a*) State distinctive features of *four* of the following orders with suitable examples :

Polynemiformes
Cypriniformes
Anguiliformes
Beloniformes
Lamniformes
Mugiliformes.

(*b*) Write a short note on the economic importance of the order cypriniformes. $(2\frac{1}{2} \times 4) + 2\frac{1}{2}$

2. (*a*) Mention the different sources of plant and animal proteins used in supplementary feed.

(*b*) Discuss the 'best-bye' or 'least cost' technology. Calculate to compare the cost of supplying a particular ingredients using the "least-cost" techniques, when—

(*i*) Groundnut oil cake contains 42% protein and costs INR 20·00.

(*ii*) Fish meal contains 54% protein and costs INR 40·00.

(*c*) If you wish to formulate a 30% protein IMC grower feed from fish meal (54% protein) and wheat bran (18% protein). Calculate the requirement of fish meal and wheat bran meal to make 100 kg feed by using the "square method of Hardy 1975". $4\frac{1}{2} + 4 + 4$

Or

What is the importance of electroreception in fishes ? Write on the various electroreception organs seen in fishes with suitable illustration and examples.

3. Write any *two* of the following : $6+6\frac{1}{2}$

(*a*) Relationship between photoperiod and fish growth with suitable illustrations.

(*b*) Dissolved oxygen and fish growth—Explain the relationship with illustrations.

(*c*) Gastrosomatic and gonadosomatic indices and their uses.

(*d*) Calculate the Protein Efficiency Ratio (PER) and Feed Conversion Ratio (FCR) and comment on your results, when—

Final weight of each fish— 20 g
Number of fish— 10
Initial weight of each fish — 10 g
Duration of Experimental trial — 60 days
Feed given— @ 6% body weight day-1
Protein in feed— 30%.

4. Answer any *three*: $4+4+4\frac{1}{2}$

(*a*) Parental care in fish.

(*b*) Biotic factors influencing fish growth.

(*c*) Thyroid hormones and their functions.

(*d*) Distinctive features of class Teleostomi with suitable examples.

(*e*) Length-weight relationship.

UNIT—II

(*Limnology and Oceanography*)

5. Define 'Limnology'. What are the major biotic communities in a freshwater environment ? State the adaptive features of animals inhabiting in the lotic environment. $1\frac{1}{2}+5+6$

6. Define Lake. Give a classificatory scheme of different types of lakes. Add a note on thermal stratification. $2+6\frac{1}{2}+4$

7. Write short notes : $4+4+4\frac{1}{2}$

(*i*) Upwelling and outwelling

(*ii*) Chemical composition of seawater

(*iii*) Thermohaline circulation

(*iv*) Vertical migration of Zooplankton

(*v*) Ecological role of benthic fauna.

8. Explain precisely with suitable diagram of the following : $7+5\frac{1}{2}$

(*a*) Horizontal and vertical zonation of Oceanic environment.

(*b*) Macrobenthic communities of the marine environment.

GENETICS SPECIAL

UNIT—I

(*Molecular Biology*)

1. (*a*) Describe briefly the extrinsic death receptor pathway of apoptosis with the help of a diagram.

(*b*) Mention briefly the process of apoptosome formation and its role in apoptosis.

(*c*) Mention one important protein and its role in blocking the death receptor induced apoptosis. $5 + 4 + 3\frac{1}{2}$

2. (*a*) Mention briefly the mechanism of self -splicing and the subsequent circularization of the excised group I intron with a neat diagram.

(*b*) Diagram the lariat mechanism of splicing. Present a gel electrophoretic data that suggest that the excised intron is circular or lariat shaped.

(*c*) Two eukaryotic genes encode two different polypeptides. One gene contain a single exon, the other gene contains an intron 41,324 bp. Which gene would you expect to be transcribed in the least amount of time ? Why ? When the m RNAs specified by these genes are translated, which mRNA would you expect to be translated in the least time ? Why ? $4\frac{1}{2} + 4 + 4$

3. (*a*) What are GTFs? State the name of GTFs associated with RNA polymeras II and describe their role in transcription initiation by RNA polymerase II.

(*b*) Characterize the core promoters in the eukaryotic cell.

(*c*) Mention the characteristic feature of transcription motif Leucine Zipper.

$(2+4\frac{1}{2})+2\frac{1}{2}+3\frac{1}{2}$

4. (*a*) Describe different histone modification and tabulate their significance.

(*b*) What do you understand by histone variants?

(*c*) Define chromodomain and bromodomain.

(*d*) What is SWI/SNF? Mention its functional role?

(*e*) If a sample of chromatin found to contain 1 picomole of histone H 1, how much of the other histones would it contain? $5+1\frac{1}{2}+2+2+2$

UNIT—II

(*Genetics*)

5. With proper illustrations explain the differences between Holliday's model and that of Meselson and Radding of recombination, giving proper emphasis on "strand invasion", heteroduplex formation" and "branch migration and resolution". $6+6\frac{1}{2}$

6. (*a*) The Punnet square below depicts the results of four deletions of four phage T4 mutants from their complementation analysis, where '+' denotes production of wild type plaques as a result of recombination and '0' means absence of wild type progeny.

	1	2	3	4
1	0	0	+	+
2	0	0	0	+
3	+	+	0	0
4	+	0	+	0

Draw a linear deletion map of the four mutants with appropriate diagram and explanation.

(*b*) How double lysogens are formed?

(*c*) What do you understand by specialized transduction and transduction of lysogeny itself? $6\frac{1}{2}+3+3$

7. (*a*) Mention the role of DSX^M and DSX^F (doublesex gene) in Drosophila sexual development.

(*b*) Write a brief note on the Transformer gene(tra) in Drosophila sex determination.

(*c*) State briefly the role of WNT4 gene in sex determination. $5 + 4 + 3\frac{1}{2}$

8. (*a*) What does the term cotransduction mean? How can cotransduction frequencies be used to map genetic marker?

(*b*) A donor strain of bacteria with genes $a^+ b^+ c^+$ is infected with phages to map the donor chromosome with generalized transduction. The phage lysate from the bacterial cell is collected and used to infect a second strain of bacteria that are $a^- b^- c^-$. Bacteria with the a^+ gene are selected, and the percentage of cells with cotransduced b^+ and c^+ genes are recorded

Donor	Recipient	Selected gene	Cells with cotransduced gene (%)
$a^+ b^+ c^+$	$a^- b^- c^-$	a^+	25 b^+
		a^+	3 c^+

Is the *b* or *c* gene closer to *a*? Explain your reasoning.

(*c*) Compare the similarities and differences between transduction and sexduction.

$(2+3)+5+2\frac{1}{2}$

ECOLOGY SPECIAL

UNIT—I

(*Soil Ecology*)

1. Enumerate major soil orders with their distinctive features and distribution. Add a note on laterization.

$10+2\frac{1}{2}$

2. What is humus ? Distinguish between 'mull' and 'more' type of humus. Discuss in brief the role of soil fauna in leaf litter decomposition. Add a note on the dynamics of litter breakdown. $1\frac{1}{2}+2+5+4$

3. Name the extractors used in extraction of soil micro-arthropods. Compare the working principles of a 'dry funnel ' and a 'wet funnel ' methods. Which method you recommend for the extraction of soil mites and why ? $2\frac{1}{2}+6+4$

(*Continued*)

4. (*a*) Write notes on any *two* :

(*i*) Soil texture

(*ii*) Soil profile

(*iii*) Soil moisture

(*iv*) Soil temperature.

(*b*) Answer *one* of the following :

(*i*) Oribatida as bioindicator of industrial pollution.

(*ii*) *A* and *B* horizons of soil. $(4+4)+4\frac{1}{2}$

UNIT—II

(*Forest and Wild Life Ecology*)

5. What are the 16 (sixteen) different 'Forest Types' of India as per Champion and Seth's Classification ? Which of the 'forest types' are available in West Bengal ? In which district of West Bengal you find 'Brackish Water littoral forests' ? $8+4\frac{1}{2}$

6. Enumerate the salient structural and functional characteristics of tropical forest ecosystem. Discuss in brief the stratification of animal life in such forest. $4\frac{1}{2}+8$

7. Discuss the concept of 'Biosphere Reserve'. What is 'SLOSS' debate ? Name three Biosphere Reserves of North East India and mention the state where these are located. Name three critically Endangered vertebrates which are likely to be found in West Bengal. $5+1\frac{1}{2}+3+3$

8. (*a*) Answer *one* of the following :

   (*i*) Past and present distribution, causes of threat, present red list status (Version 3·1) and food habit of *Antilope cervicapra* .

   (*ii*) Extent of deforestation in India.

   (*b*) Write a note on *one* of the following :

   (*i*) Turnover time of elements in forest

   (*ii*) Threat Types Authority File (version 2·1). $7\frac{1}{2}+5$