2007

ZOOLOGY

Group-A

PAPER-IXA

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]

Full Marks : 50

Time : **2 hours**

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

UNIT-1

(Fish Taxonomy and Biology)

1. (i) State the distinctive features of the following order with suitable examples (any *four):* $21\frac{2}{2}$ x4

Lamniformes, Squaliformes, Torpediniformes, Lepidosireniformes, Cypriniformes, Angulliformes, Syngnathiformes, Mugiliformes.

(ii) Add a **note on the medicinal importance of siheroid fish during** recovery period of the **patient.** **21**

2

2. **(i) What are the natural food items of Indian major crops. Add a note on the importance of supplementary food.** $21\frac{2}{2}+2$

(ii) Calculate to compare the cost of supplying a particular non-conventional feed ingredients using `least cost technology', groundnut oil cake- 46% protein Slaughter house meal- 57% protein

[Groundnut oil cake @USD 0.3 kg-' ; Slaughter house waste @USD 1.1 kg-] 4

(in) Prepare 35% protein catfish grower feed from fish meal (59% protein) and wheat bran (14% protein), calculate the requirements of fish meal and wheat bran to make one quintal feed. 4

3. (i) Briefly describe the structure and physiology of Pituitary gland. 9

(u) State the functions of major pituitary **hormones.** $3\frac{1}{2}$

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

(**i) Biotic and abiotic** factors **influencing** fish **growth.**

(**ii) Parental care in fish.**

(***iii)*** **Structure of male and female gonad.**

(iv) Growth **in relation to ration size and age** of the fish with illustration.

UNrr-II

(Limnology and Oceanography)

5. **List the points of difference between lentic and lotic environments**. **Most of natural lakes were** formed by **catastrophic events- explain**. **State the adaptive features of rock inhabitable forms in the lotic environment**. $5+5+2\frac{1}{2}$

6. What is tide? What are the reasons for the occurrence of :ides ? What are the types of tides found in ocean? **Mention the significance**. of tides in **marine environment.**

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

7. What **are the main chemical constituents of seawater? Discuss on the distribution** and cycling **of chemical nutrients.**

	$5+3+4\frac{1}{2}$
Write **short notes** (any *three) :*	$4+4+4\frac{1}{2}$
(a) Bar-built estuary (b) Importance of continental shelf (c) Upwelling (d) Demotechnic growth (e) Vertical migration of zooplankton (f) CRZ and EEZ.	

(GENETICS AND MOLECULAR BIOLOGY
SPECIAL PAPER)

Full Marks : 50

Time : 2 hours

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

Urrrr

(Molecular Biology)

1. (1) Mention the roles of inhibitory **proteins in regulating** the cell cycle.

(i) Characterize the p 53 protein **and mention** thefunction of each **subunit**. Why is p 53 called **a tumor** suppressor **protein ?** $6+6\frac{1}{2}$

2. (1) Write the three consensus **sequences** which are re-**quired** for RNA splicing.

(ii) What do you mean by 'snurps'? What **are their composition ?**

(iii) Narrate the spliecosome assembly on the pre-mRNA transcript in a step-by-step fashion.

(iv) What is trans-splicing? $3+2+6+11\frac{1}{2}$

3. (i) Mention three important characteristics of a cloning vector.

(ii) What are the three **essential elements of an eukaryo-**tic artificial chromosome ?

(*vi*) **Mention their role in a Yeast artificial chromosome.**

(*iv*) **Mention the two types of moderately repetitive DNA. Give examples of each.**

(v) **What do you mean by T,,, ?**

$2+3+3+3+1\frac{1}{2}$

4. (i) One type of zinc finger motif consists of an a helix and a u-sheet held together by a zinc ion. When this motif binds to DNA, the a helix is positioned in the major groove where it makes specific contacts with the bases. Why is this motif thought to enjoy a particular **advantage** over other DNA-binding motifs when the strength and specificity of theDNA-protein interaction need to be adjusted during evolution?

(ii) The glucocorticoid receptors relies on three discrete **domains** What are they ? What is their function ?

(*vi*) What are the characteristics pattern of Transcription **factor SF 1 ?**

$5+5+2\frac{1}{2}$

UNrr II

(Genetics)

5. (i) Seven different nil point mutants (1 to 7) of phage T4 were tested for recombination crosses in *E.coliB* with the five deletion strains A, B, C, D, E. The following results were obtained, where + = r+ recombinants produced and 0 = no r+ recombinants produced.

		B	C	D	
1	0	+	0	+	+
2	+	0	0	+	+
3	0	+	0	+	0
4	+	+	0	+	0
5	+	0	0	0	+
6	0	+	0	0	+
7	+	+	0	0	+

In which regions of the map can you pace the seven point **mutations ?**

(ii) (a) In the white locus, how would you **determine the relative position of an allele ?**

(b) If you obtain a new allele of locus, **how would you determine whether the allele is in the left of marker allele or in the right? Briefly describe the design of the experiment**.

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

6. (i) What does the term cotransduction mean ? **How can cotransduction frequencies be used to map genetic markers ?**

(ii) Distinguish between Lft (low frequency **transduction) and Hft** (**high** frequency **transduction).,**

(iii) **In a transduction expt**. **the donor was** ***c*** + ***d*** + ***e*** + **and** the recipient was *cde*. Selection was for-c+. The four **classes** of transductants from this experiment were

Class	Genetic Composition	Number of Individuals
1	c+ d+ e+	57
2	c+d+e	76
3	c+ de	365
4	c+ d e+	2
		500

(a) Determine the cotransduction frequency for c+ and d-.

(b) Determine **the cotransduction** frequency for c+ and e+.,

(c) Which of the cotransduction frequencies calculated in *(a)* and *(b)* represents the greater actual distance between genes ?,Why? $3\frac{1}{2}+3+6$

7. (i) What is, a Holiday Model? How does the model fit **into a single** strand or a double strand break proposal. Keep proper **diagram.**

(ii) With proper illustration discuss the role of the protein involved in recombination. $12\frac{1}{2}$

8. (i) How do the chromosomal mechanisms of sex determination differ between humans and Drosophi-**la?**

(ii) What are the sexual phenotypes of the following genotypes in Drosophila : XX, XY, XXY, XXX, XO?

(iii) Suppose that a mutation occured in the SRY gene on the 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.

(iv) Would a **human** with two X-**chromosome and** aY-chromosome be male or female?

v) Mention the role of SOX 9 **in testis** formation.

3+2$\frac{1}{2}$+2+2+3

(ECOLOGY SPECIAL PAPER)

Full Marks : 50

Time : 2 hours

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

UNrr-I

(Soil Ecology)

1. Distinguish between `ped' and `clod'. What is pedogenesis ? Discuss in brief soil formation processes with special reference to the role played by soil biota.

1+11$\frac{1}{2}$+10

2. Distinguish between hemiedaphic and euedaphic organism. Classify soil animals on the basis of:

(a) habitat preference

(b) size and

(c) duration of stay in soil. $2+(3\frac{1}{2}+3\frac{1}{2}+3\frac{1}{2})$

I Why soil is regarded as a subsystem and not an ecosystem ? Discuss role played by soil fauna in, energyflowand nutrient **cycle in soil subsystem.**

$21\frac{1}{2}+10$

4. `Modern agricultural practices greatly affect the soil faunal growth and diversity.' Justify the statement with suitable examples. Can soil fauna be used as indicator of the quality of soil ? $10+21\frac{1}{2}$

UNrr- II

(Forest and Wildlife Ecology)

S. Define tropical rain forest. **Discuss salient features in the** production **and nutrient** cycle in a tropical forest. $21\frac{1}{2}+10$

6. Enlist 16 megadiversity countries of the world. Name 3 biodiversity hot spots of India. **Discuss in** brief the types and causes of species extinction. What is pseudo-extinction'? In which year Biodiversity Act was enacted in India? $4+1+5+2+1\frac{1}{2}$

7. What is version 3.1 : IUCN (2001) ? Mention categories and abbreviations adopted in this version. Name the category to which a species belongs to if the estimated number is less than 250 individuals and the probability of extinction in wild **is at** least 50% with in next 10 years. Name five critically endangered vertebrates of India. $2\frac{1}{2}+4+1+5$

8. Name different sub-species of Tiger. Give a brief account of the population status; feeding and breeding of Indian **tiger**. Write a note on the major threats to survival of tiger **and measures** taken towards the conservation of this **endangered animal.** $2+6\frac{1}{1}+4$