PG/IVS/Z-403/10

M.Sc. 4th Semester Examination 2010

ZOOLOGY

PAPER—Z-403

Full Marks : 40

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

Illustrate the answers wherever necessary

Write the answers to questions of each Group in separate books

[Ecology Special Paper]

GROUP—A

(*Human Ecology*)

1. Answer any *two* of the following : 2x2

(*a*) What is E.I.A ?

(*b*) Mention the causes and consequences of soil erosion.

(*c*) Enlist the merits and demerits of ecotourism.

(*d*) What is demographic transition ?

2. Answer any *two* of the following : 4 x 2

(*a*) Mention the criteria for considering an area as to be an urbanised area.

(*b*) Discuss 'Restoration Threshold' in terms of biotic and abiotic interactions.

(*c*) Highlight the causes, effects and future of Human Population Growth.

(*d*) Organochlorine insecticides are mainly responsible to cause environmental pollution — Why ?

3. Answer any *one* of the following : 8 x 1

(*a*) Differentiate point and non-point pollution. Discuss the impact of chemical fertilisers as both point and non-point pollutants. 2 + 2 + 4

(*b*) Mention the relationship between greenhouse effect and global warming. Briefly discuss the effect of global warming mediated temperature stress on reproduction and dispersal of animals. 8

GROUP—B

(*Aquatic Ecology*)

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

(*a*) Define thermocline.

(*b*) What is coral bleaching ?

(*c*) Enlist different threats on marine biological diversity.

(*d*) Differentiate EEZ from CRZ.

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

(*a*) State the reason why coral reef harbour higher diversity of flora and fauna.

(*b*) Why mangrove ecosystem is considered as the most productive ecosystem of the world ?

(*c*) Describe the secondary treatment technique of sewage water.

(*d*) Classify lakes on the basis mixing pattern.

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

(*a*) Define Wetland. Give a classificatory scheme of wetland. Highlight the values of wetland. $1\frac{1}{2} + 2\frac{1}{2} + 4$

(*b*) Define estuary. Classify estuary based on evaporation and precipitation, stratification and on origin. Enlist major sources of estuarine pollution. 8

[Fishery Special Paper]

GROUP—A

(*Limnology and Oceanography*)

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

(*a*) Enlist different coastal regulatory zones.

(*b*) Mention the attributes for designating any landscape as wetland.

(*c*) Point out the differences of earth crust in terrestrial and marine systems.

(*d*) Highlight the adaptive features of rock inhabitants of Lotic Waterbodies.

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

(*a*) Mention the structural components of mangrove ecosystem.

(*b*) Give a classificatory scheme of wetland.

(*c*) Briefly discuss the distribution of different chemical components in marine ecosystem.

(*d*) Classify estuary based on its origin.

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

(*a*) Classify different biotic components of fresh water system. Add a note on cyclomorphosis and predation among zooplankton. 4 + (2 + 2)

(*b*) Define tide. Mention its different types and causes of its occurrence. Add a note on functional role of tide in marine ecosystem.

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

GROUP—B

(Inland and Marine Fisheries)

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

(*a*) State four major trends of Indian Aquaculture in recent years.

(*b*) How bio-environmental components influencing fisheries in relation to public health ?

(*c*) Give the names of major marine products of India having exports potential.

(*d*) Distinguish between : Sewage and Sludge.

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

(*a*) What is Reservoir ? State names of four the reservoirs in the eastern part of India. What are the "different planktonic periods" present in Indian reservoir ? 4

(*b*) Distinguish between : 2 + 2

(*i*) Domestic sewage and Industrial sewage.

(*ii*) Catadromous Fish and Anadromous Fish.

(*c*) "Estuary is a buffer zone between Freshwater of the stream and saltwater of the sea"— Justify it with a suitable example. 4

(*d*) Write notes on : 2 + 2

(*i*) Major Crustacean Resources of the World seas.

(*ii*) Backwater Fishery.

6. Answer any *one* of the following : 8 x 1

(*a*) Write notes on (any *four*) of the following : 2 x 4

(*i*) Waste stabilization pond

(*ii*) Primary treatment of sewage

(*iii*) Name two important fishes of Indian coast

(*iv*) Application of remote sensing in fishery

(*v*) What is meant by oxidation pond ?

(*vi*) Effect of Raw sewage on fisheries.

(*b*) Answer the following questions : 8

(*i*) Prospects of reservoir fishery in India.

(*ii*) Importance of Pelagic Fish Resources of India.

(*iii*) Present day Freshwater fish culture systems.

[Genetics and Molecular Biology Special Paper]

GROUP—A

(*Recombinant DNA and Molecular Analysis*)

1. Answer any *two* questions : 2 x 2

(*a*) Mention three features of pBR 322 that make it useful as a cloning vector.

(*b*) Distinguish between RNaseH and RNaseA.

(*c*) What do you mean by a shuttle vector? Cite examples.

(*d*) Why it is essential to remove all DNA from the RNA samples before northern analysis?

2. Answer any *two* of the following : 4x2

(*a*) Briefly describe the principle of the Western blotting technique. Mention two differences with south blotting technique. 2 + 2

(*b*) Compare siRNA and miRNA. What is RNAi? 3 + 1

(*c*) Distinguish between neoschizomers and isoschizomers with examples. 4

(*d*) How many clones would you need in a genomic library made from *E. coli* to have a 99% chance of cloning a particular gene? Assume, you used *Bam HI*, a hexa-cutter, to digest 4·6 Mbp *E. coli* genome. 4

3. Answer any *one* question : 8x1

(*a*) (*i*) What are differences between cDNA library and genomic DNA library?

(*ii*) Describe how asymmetric PCR could be used for sequencing purpose.

(*iii*) What are the advantages of real time quantitative PCR over traditional PCR ?

(*iv*) Explain the chemistry of 'Taqman Probe'. 2 + 2 + 2 + 2

(*b*) (*i*) Define RFLP. Briefly mention its principle.

(*ii*) Mention advantages of discontinuous gel electrophoresis.

(*iii*) Write the sequence from 5′ to 3′ of this flowgram of pyrosequencing procedure : 3 + 2 + 3

GROUP—B

(*Applied Genetics*)

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

(*a*) What is VNTR ? State the differences between microsatellite and VNTR.

(*b*) Enlist the steps through which great diversity of Immunoglobulins are generated.

(*c*) What is a HAT medium ?

(*d*) How could you distinguish from immunoglobulin gene rearrangements and alternative splicing ?

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

(*a*) Briefly describe the roles of DNA-PK and RAG-1, RAG-2 in Ig gene rearrangement. 4

(*b*) What is autoimmunity ? Add a note on any one autoimmune disease you have studied. 1 + 3

(*c*) Define Monoclonal Antibody (MAb) Enumerate the production protocol of MAb. $(\frac{1}{2} + 3\frac{1}{2})$

(*d*) RAPD Markers

Progeny	729 S 435	E 10 S 469	362 S 244
1	-	+	-
2	+	-	+
3	-	+	+
4	-	-	-
5	-	-	+
6	+	+	-
7	+	-	-
8	+	-	+
9	+	+	+
10	+	-	+
11	-	+	+
12	-	+	+

+ indicates the RAPD marker amplified
- indicates the RAPD marker failed to amplify.
The above table lists data from three RAPD loci in the progeny of a cross between two parents. Comment whether the result are those from test cross of F_2 progeny ? Explain your comments. 4

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

(*a*) Halushka and Colleagues used specially designed DNA chips to search SNPs in 75 protein coding genes in 74 individuals. They scanned about 189 Kb of genomic sequence consisting of 87 Kb of coding, 25 Kb intron and 77 Kb untranslated but transcribed sequences. They identified a total of 874 possible SNPs of which 387 were within coding sequences which were designated as eSNPs; 209 of these 387 cSNPs would change the amino acid sequence.

(*i*) In their sample, what is the frequency of SNPs (# bp/SNP) ?

(*ii*) Are the SNPs evenly distributed in coding and non-coding sequences ?

(*iii*) A reasonable estimate of the human gene number is 75,000.

(*I*) Calculate how many SNPs exist in human genes ?

(*II*) How many are estimated to be in non-coding region ?

(*III*) How many cSNPs are in coding regions that do not affect protein structure ?

(*IV*) How many are in coding regions and would affect protein structure ?

(*b*) The figure below is the diagrammatic representation of the electrophoretic pattern of an enzyme with proper marking. Explain the allelic nature of the enzyme.