M.Sc.

4th Semester Examination - 2019

ZOOLOGY

Paper - ZOO 403

Full Marks : 40 Time : 2 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

SPECIAL PAPER : ECOLOGY

Group - A

(Systems and Molecular Ecology)

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

   (a) Compare the efficacies of two Quotients of Similarity proposed by Sorensen as compared to that of Bray & Curtis.

   (b) Depict the processes related to Ecorestoration graphically.

[Turn Over]

(c) Illustrate the different plant strata in a Tropical forest.

(d) Differentiate between species Richness and species evenness.

2. Answer any *two* questions : 2×4

(a) (i) Provide two significant reasons to substantiate the effects of genetically modified organisms on wildlife in India.

(ii) Explain the significance of nuclear DNA markers for conservation of wildlife. 2+2

(b) Illustrate the time variations of vertical and horizontal movements in a lake. 4

(c) How can forests be classified on the basis of crown cover ? Why are tropical forests more productive than temperate forests ? 2+2

(d) Distinguish between Patch and Landscape. What do you mean by corridor and matrix ? Why is Ecorestoration referred to as 'Acid-Test' ? 2+1+1

3. Answer any *one* question : 1×8

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

(i) Deterministic vs. Stochastic model.

(ii) Biotic vs. Abiotic species diversity hypothesis.

(iii) Levins Model of metapopulation.

(iv) Merits of Ecotourism.

(v) Nutrient cycling & its ecological significance.

(vi) Fragmentation of Habitat and its significance to animal distribution.

(vii) Index of Dispersion.

(b) (i) Define Colonization. Describe source-sink system in relation to metacommunity with suitable example. How does this differ from Patch-dynamics paradigm ? 1+3+2

(ii) Classify lakes on the basis of their trophic status. 2

[Turn Over]

Group - B

(Human Ecology)

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

(a) What is Ecomark ?

(b) What are the merits and demerits of Environmental Pollution Act of India.

(c) Enlist different global environmental issues.

(d) Highlight the significance of "Thermal Inversion in respect of atmospheric pollution.

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

(a) "Sustainability"— a key concept of environmental resource management.

(b) Expalin underlying scientific principles for global climatic change.

(c) Schematically represent the classificatory scheme of solid wastes.

(d) Enlist different Indoor pollutants with examples.

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

(a) Discuss the merits and demerits of urbanization on biodiversity. Add a note on the impact of rising temperature on the parental care of reptiles. 5+3

(b) Define E.I.A. What are the different steps of E.I.A. ? Briefly highlight the criteria for developing 'Green Belt' in and around industries. 2+3+3

SPECIAL PAPER : FISHERY

Group - A

(Aquaculture and Fish Technology)

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

(a) Write short notes on cryoprotactants.

(b) Mention the characteristics of Siluriformes (cite examples).

(c) Mention the difference between natural and selective breeding.

(d) How does Aquaculture effect on Rural development.

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

(a) Short notes on indigenous crafts.

(b) What is hypophysation ? Mention its role in Aquaculture.

(c) Briefly describe the types of integrated fish farming.

(d) What do you mean by the brood fish care.

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

(a) Write down about the post harvesting technologies which are popular in India.

(b) Give a brief account of fishing gears which are used in India.

Group - B

(Inland and Marine Fisheries)

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

(a) State the divisions of an estuary on the basis of salinity. 2

(b) What is back water fishery ? Cite an example for the said system. 2

(c) Why conservation is essential for reservoir fishery ? 2

(d) Write note on : offshore fisheries. 2

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

(a) Elaborate the ideas leading to the eutrophication in reservoir. 4

(b) How can you demonestrate the visual data through RS-System ? 4

(c) Prepare a check list mentioning the names of marine products exported from India. Write a note on : Public Health Fishery. 2+2

(d) Write notes on : 2+2

(i) Present day aquaculture systems.

(ii) Trophic phases of a new reservoir.

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

(a) What is sewage ? How does raw sewage effect animal life in aquatic system ? Distinguish

between the Domestic and Industrial sewage with examples. Mention the application of RS-system in Aquaculture practice.

2+2½+1½+2=8

(b) Write short notes of the following (any *four*) : 4×2

(i) Facultative pond

(ii) Positive Remote Sensor

(iii) Algal Bloom

(iv) CIFAX.

(v) Biology of Shrimp.

(vi) Fish migration.

SPECIAL PAPER : GENETICS & MOLECULAR BIOLOGY

Group - A

(Recombinant DNA and Molecular Analysis)

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

(a) What do you mean by competent cell ? 2

(b) What is Tm value ? 2

(c) What do you mean by "terminal transferase" activity of Taq polymerase ? 2

(d) State the differences between quantitative and semi quantitative real time PCR. 2

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

(a) What do you mean by repetitive DNA ? How does repetitive DNA used in RFLP. 4

(b) Describe step by step strategy for the construction a recombinant plasmid vector. (Single Gene Cloning). 4

(c) In what way liquid phase pyrosequencing differs from solid phase pyrosequencing. State the advantages of liquid phase method. 3+1

(d) State the principle of Microarray. Comment on its application. 3+1

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

(a) (i) Describe Sanger's method of DNA sequencing with proper diagram.

(ii) In what ways expression vectors differs from cloning vector. 6+2

[Turn Over]

(b) (i) State the properties of fluorescent probes used in real time PCR.

(ii) Explain how induced expression is carried out ? 5+3

Group - B

(Applied Genetics)

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

(a) In a particular species, the gene for kappa light chain has 200 V gene segments and 4 J segments. In the gene for lambda light chain, this species has 300 V segments and 6 J segments. If only the variability arising from somatic recombination, how many different types of light chains are possible ?

(b) Why Ig gene rearrangement does not occur in T cells even though RAG is expressed in these cells ?

(c) If digestion of a 1000bp DNA with restriction enzyme A gives you fragments of size 200 and 800bp and digestion with enzyme B gives you fragment of size 400bp and 600bp, then construct a restriction map of A and B for that 1000bp DNA.

(d) Name two bacteria which are discovered from the human gut microflora by metagenomic study.

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

(a) The presence (+) or absence (–) of six sequence-tagged sites (STSs) in each of five bacterial artificial chromosome (BAC) clones (A-E) is indicated in the following table. Using these markers, put the BAC clones in their correct order and indicate the locations of the STS sites within them.

	STSs					
BAC clones	1	2	3	4	5	6
A	+	–	–	–	+	–
B	–	–	–	+	–	+
C	–	+	+	–	–	–
D	–	–	+	–	+	–
E	+	–	–	+	–	–

(b) What happens ?

(i) When recombination occurs between two genes segmens that are transcribed in the same direction during V(D)J recombination.

(ii) When recombination occurs between two gene segments that are transcribed in opposite direction during V(D)J recombination. 2+2

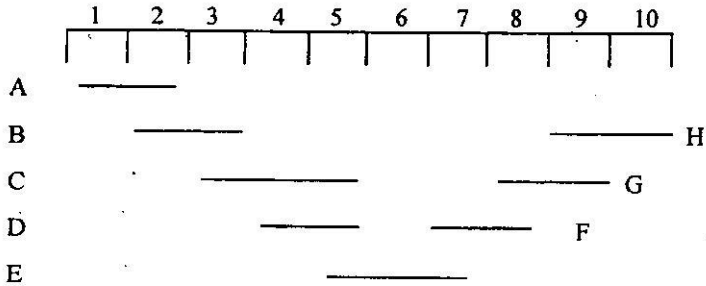
(c) Present a hypothesis for the neurotoxic effect of an expanded polyglutamine tract in huntingtion. Provide evidence to justify your hypothesis.

(d) What are the significant features we got from human X-chromosome sequencing ?

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

(a) Describe the first phase (DNA recognition and cleavage) and second phase (end processing and joining) of V(D)J recombination for B-cell receptor variation.

(b) A contig map of one segment of chromosome 3 of Arabidopsis is shown below :



(i) If an EST hybridizes with genomic clones C, D, E, but not with other clones, in which segment of chromosome 3 is the EST located.

(ii) If a clone of gene ARA hybridizes only with genomic clones C and D in which chromosome segment is the gene located ?

(iii) If a restriction fragment hybridizes only one of the genomic clones shown above, in which chromosome segment(s) could the fragment be located ? 2½+2½+3

[Turn Over]

SPECIAL PAPER : PARASITOLOGY

Group - A

(Vector Biology and Vector borne Parasites)

1. Answer any *two* questions : 2×2

   (a) Define Mechanical and Biological Vector. Cite one example in each case.

   (b) What are hypnozoite and cryptozoites ?

   (c) What is pygidium ? Mention its function.

   (d) What do you mean by anterior station development in Leishmania ?

2. Answer any *two* questions : 2×4

   (a) What is myiasis ? Describe in brief, different types of myiasis with example. 1+3

   (b) Write a note on the jumping mechanism of flea.

   (c) What is 'Q' fever ? Mention its symptoms and diagnostic method. 1+3

   (d) Explain why vaccination against malaria is not being effective still to date.

3. Answer *one* question : 1×8

(a) Briefly describe the life cycle of tick. Mention the effective controlling measures for tick vectors. Give example of one hard tick and one soft tick. 4+3+1

(b) (i) What are VAT and VSG ?

(ii) Write short notes on Typhus fever. 5+3

Group - B

(Molecular Parasitology and epidemiology)

4. Answer any *two* questions : 2×2

(a) What do you mean by Land Scape Epidemiology ?

(b) What is CLIA ?

(c) Define intra assay variation.

(d) State the advantages and limitations of Taq polymerase.

5. Answer any *two* questions : 2×4

(a) What is cross reaction ? Name the enzymes used in ELISA. 3+1

[Turn Over]

(b) Describe the nature of standard curve of C ELISA and S ELISA.

(c) Differentiate disease and disease syndrome with suitable example.

(d) State in brief the unique characteristics of gene expression in *Trypanosoma*.

6. Answer *one* question : 1×8

(a) Discuss in brief the epidemiology of Kala-azar. Differentiate solid phase and liquid phase of ELISA. 5+3

(b) (i) Write in brief the method of Cohort study and add a note on its limitations.

(ii) How control population could be selected for case control study ?

(iii) Write the principle of S ELISA. 4+2+2