M.Sc.

2016

4th Semester Examination

ZOOLOGY

PAPER—ZOO–403

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 of the following.

(SPECIAL : GENETICS & MOLECULAR BIOLOGY)

Group — A

(*Recombinant DNA and Molecular Analysis*)

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

(a) What is Chemiluminescence ?

(b) What do you mean by shuttle vectors ?

(c) What is C_T value in Real time PCR ?

(d) What is quencher ? State its application.

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

(a) State the principle of pyrosequencing and states its advantages over traditional sanger method. 3+1

(b) Active site of a DNA binding protein contain following amino acids :

– Ser – Tyr – Len – Len – Thr – Sev – Arg – Arg –

and corresponding DNA sequence of Nontemplate stand is :

5′ UCAUACCUACUAACAUCACGCCGC 3′

(i) Construct Forward Primer inducing mutation at 'Thr' residue.

(ii) Illustrate the procedure of inducing the mutation and states its significance. 1+2+1

(c) 'VEGF induces upregulation of Cyclin D in G, phase of cell cycle'. Set up an experimental design using FRET, to prove the formation of active cyclin D CDK4 complex.

Explain the mechanism behind the procedure. 2+2

(d) (i) State the principle of FISH.

(ii) What are the specific properties of Type-II Restriction endonuclease ? 2+2

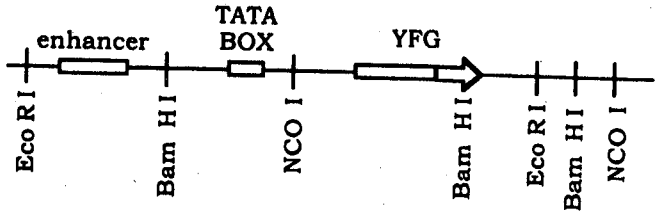
3. Answer any *one* question of the following : 1×8

(a) (i) State the properties of fluroscent probes used in Real time PCR with example.

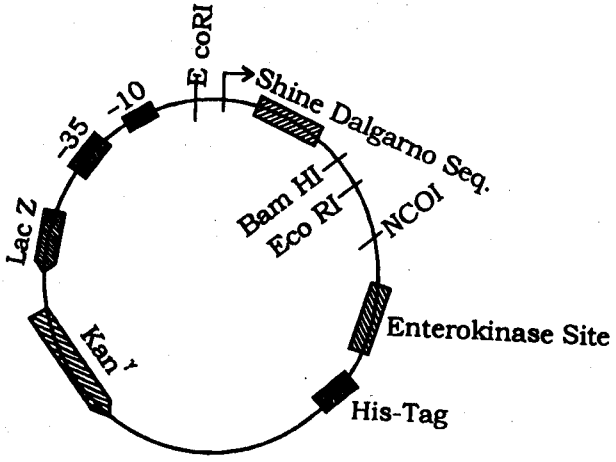
(ii) State the importance of Tm value in PCR.

(iii) Show diagrammatically to construct double round Nested Primers. 4+2+2

(b) The diagram below represents a section of the human genome. The coding sequence of a gene YFG, is shown by an arrow, and boxes indicate the locations of some regulatory sequences. Locations of recognition sequences (cut sites) for three restriction enzymes (EcoRI, BanHI and NCOI) are also marked :



You would like to clone this in *E. Coli* for further study. You have available expression vector (Plasmid) shown below :



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

(ii) Why is it important to have antibiotic resistance gene and enterokinase site in this expression vector ?

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

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

2+2+2+2

Group — B

(*Applied Genetics*)

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

(a) What is rifflip ? How is it detected ?

(b) Write a DNA sequence containing ORF (Open Realing Frame).

(c) What do you mean by conserved sequence ? Give an example.

(d) What is HAT medium ? Mention its significance.

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

(a) What is CPG island ? Why CPG sequence tends to disappear from the human genome ?

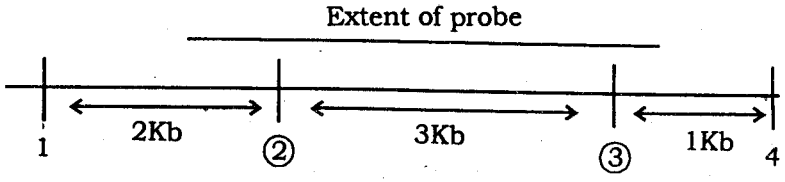
(b) Describe the application and limitations of immunofluorescence. 2+2

(c) Diagrammatically illustrate the steps of identification and construct DNA library of uncultured microbial community of an environmental sample through metagenomic approaches.

(d) Discuss briefly about the steps of Monoclonal Antibody (MAb) production procedure.

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

(a) (i) The following is a Physical map of a region constructed by RFLP analysis :



The numbered vertical lines represent restriction sites recognized by Sma I ② and ③ are Polymorphic. Cut DNA with Sma I, electrophorese the fragments, blot them and probe with a DNA whose entent is shown at tip. Give the sizes of the fragments you will detect in individuals homozygous for the following haplotypes with respect to site ② and ③ :

Haplotype	*Site 2*	*Site 3*	*Fragment Size*
A	Present	Present	
B	Present	Absent	
C	Absent	Present	
D	Absent	Absent	

(ii) Elucidate the mechanism of Shotgun sequencing with proper illustration. State its significance in metagenomics.

5+3

(b) Discuss about the factors those are associated with the development of autoimmune disease. Mention the symptoms and treatment of Grave's disease.

Write the name of two fluroscent compound used in Immunofluorescence (IF) technique.

5+2+1

(SPECIAL : ECOLOGY)

Group — A

(*Systems and Molecular Ecology*)

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

(a) Illustrate Thermocline in Lakes.

(b) Explain the reasons of high productivity in Tropical Forests.

(c) Mention the merits and demerits of Ecotourism.

(d) Mention the compelling reasons for carrying out Ecological Restoration.

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

(a) Draw a Lacustrine zonation and list the various microfloral communities inhabiting the habitat.

(b) What are the different landscape states defined by the degree of habitat destruction ?

(c) State the four conditions necessary for Metapopulation to be applied to a system.

(d) How can species within a community be classified into functional groups ? Cite an example.

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

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

(i) Applications of Ecological modelling ;

(ii) Edge effect ;

(iii) Forest crown cover types ;

(iv) Reclamation *vs.* Rehabilitation ;

(v) Relation between Dispersal and Metacommunity ;

(vi) Reasons of Synchrony ;

(vii) Impact of GMOS on environment.

(b) (i) Define Index of Dispersion and Index of Clumping. Add a note on the scale of variance / mean ratio used to explain pattern of distribution.

(ii) Explain the two contrasting views of the Community. 4+4

Group — B

(*Human Ecology*)

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

(a) Highlight the role of Carbon Sequestration.

(b) Briefly explain Thermal Inversion.

(c) Enlist factors leading to Soil Erosion.

(d) Define Eco Mark.

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

(a) Briefly discuss different process of waste recyling.

(b) Highlight sources and mode of action of two major Indoor pollutants.

(c) Explain the necessity of undertaking EIA.

(d) Briefly discuss the mode of impact of global warming on sex determination in reptiles.

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

(a) Mention the criteria for considering a place as Urban area. Briefly discuss the merits and demerits of urbanisation. Comment on the demographic trends of human population growth in developing countries. 2+3+3

(b) What is Sustainable Development? Mention its different types. Elaborate the concept of Sustainable Development as per Cairo Conference. 2+2+4

(SPECIAL : FISHERY)

Group — A

(*Aquaculture and Fish Technology*)

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

(i) State the significance of brood fish rearing. 2

(ii) Explain the importance of Bandh breeding. 2

(iii) State the advantages of induced spawning. 2

(iv) What is organic aquafarming? 2

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

(i) Write a note on Cryopreservation of gamet. 4

(ii) What do you mean by Integrated fish farming? What are different types of Integrated fish farming? 2+2

(iii) Write a note on major diseases of freshwater fishes. 4

(iv) Write in brief on the 'Agro-Animal-Fish integrated farming system. 4

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

(i) Discuss in detail the Post harvest Technology of marine fishes and add a note on its significance. 6+2

(ii) Write explanatory notes on : 2+2+2+2

(a) Preparation of fish meal,

(b) Fish protein concentrate (FPC) ;

(c) Fish oil ;

(d) Fish flour.

Group — B

(*Inland and Marine Fisheries*)

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

(a) Prepare a checklist of inland fisheries resources in West Bengal. 2

(b) Give the scientific name and systematic position of the Indian oil Sardine. 1+1

(c) Write a brief note on the biological hazards associated with the sewage fed fishery. 2

(d) Why fishery extension activities are very much essential for Aquaculture system ?

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

(a) Discuss conservation strategies for the inland captive fish species in India. 4

(b) Write notes on : 2+2

(i) Public health fisheries ;

(ii) Backwater fishery.

(c) State the functional shapes in relaxation to remote sensing system (RS-System) in aquaculture practice. Explain the role of Active sensor in RS-System. 3+1

(d) Sometime mangrove forest in unique in costal ecology — explain why ? Write a note on : Traditional fish culture in rural Bengal. 2+2

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

(a) Give a brief account of sewage treatment process prior to its application in fish culture pond. Add a note on EEZ (Exclusive Economic Zone). 6+2

(d) Write notes on any *four* of the following : 4×2

(i) Export of marine products ;

(ii) Biology of Crab ;

(iii) Pelagic fin fishes ;

(iv) NABARD ;

(v) Fishery Co-operative ;

(vi) 'Chemical nature of Raw sewage'.

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