2011

M.Sc.

3rd Semester Examination

ZOOLOGY

PAPER—ZOO-302

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.

Group—A

(Biotechnology)

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

(a) "The restriction enzymes can not destroy the host cells DNA"—why ?

(b) What is biosensor ? Mention at least two application of biosensor. $\frac{1}{2}+1\frac{1}{2}$

(c) Which vectors (Plasmid, Phage λ, cosmid and bac) can be used to clone a continuous fragment of DNA with

the following length ?

(i) 4 kb (ii) 35 kb (iii) 20 kb (iii) 100 kb.

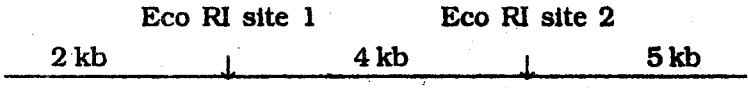
(d) Enumerate the role of different microbial enzyms for detoxification of insecticide.

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

(a) Write the features of PUC Series Vector with example.

(b) Write down the application of biomarker in medicine.

(c) Restriction mapping of a linear piece of DNA reveals the following Eco RI restriction sites



(i) This piece of DNA is cut by Eco RI, the resulting fragments are separated by gel electrophoresis. Draw a picture of the bands that will appear on the gel.

(ii) If a mutation alters Eco RI site 1 occurs in this piece of DNA, how will the banding pattern on the gel differ from the one that you drew in part(i) ?

(iii) If mutations that alter Eco RI site 1 and 2 occur in the piece of DNA, how will the banding pattern on the gel differ from the one that you draw in part (i) ?

(iv) If 500 bp DNA between two restriction sites were deleted, how would the banding pattern on the gel differ from the one that you draw in part (i)?

(d) (i) Briefly highlight the integration of different rural biotechnological tools.

(ii) Mention the advantages of vermicompost over other organic manures. 3+1

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

(a) (i) What is bioremediation? Briefly describe the In-situ bioremediation process. Mention the advantages of bioremediation. 1+4+2

(ii) What is phytoextraction? 1

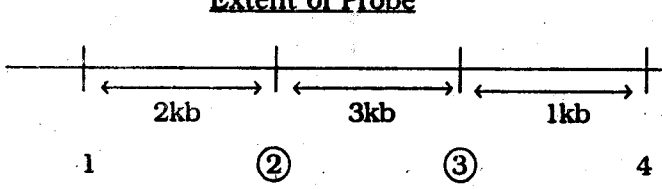
(b) (i) The gene responsible for human genetic disease is linked to a RFLP detected with a probe called B–101. You hybridize labeled B–101 DNA to DNAs from a panel of mouse-human hybrid cells.

The following table shows the human chromosomes present in each hybrid cell line. Which human chromosome carries the disease gene?

Cell line	Human chromosome content	Hybridization to probe
A	1, 2, 17	–
B	3, 5, 9, 12	+
C	5, 18, 22	–

D	1, 3, 9	+
E	2, 9, 18	–
F	2, 3, 7	+

(ii) The following is a physical map of a region you are mapping by RFLP analysis.



The numbered vertical lines represent restriction sites recognized by Sma I. The circled sites (2 and 3) are polymorphic, the others are not. You cut the DNA with Sma I, electrophorese the fragments, blot them to a membrane and probe with a DNA whose extent is shown at top. Give the sizes of the bands you will detect in individuals homozygous for the following haplotype with respect to sites 2 and 3.

3+5

Group—B

(Biochemistry)

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

(a) State the characteristics of a peptide bond.

(b) Justify the statement — "Diabetes ketosis is serious then starvation ketosis."

(c) Name the dehydrogeneses acting on Pyruvate and hectate.

(d) Describe the action of debranching enzyme on glycogen.

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

(a) Illustrate the four structural levels of Protein-organization, mentioning the basis of such hierarchy. 4

(b) None the steps of Oxidative Phosphorylation in Glycolytic pathway. How is ATP produced in this state ? 1+3

(c) Explain why Reverse glycogen can supply glucose to blood whereas muscle glycogen cannot. 4

(d) Name the end product of peroscisomal β-oxidation of fatty acid. What is the basic difference between mitochondrial and peroscisomal β-oxidation of saturated fatty acid. 2+2

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

(a) Describe the characters and action of transketolase and trans-aldolase. What is the proof of pentose phosphate Pathway operating in a tissue? 6+2

(b) Write short notes on any two of the following : 4×2

(i) Michaclis-Menton equation;

(ii) β-turn;

(iii) Secondary bonds in protein structure;

(iv) Transamination.

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