2018

M.Sc. 1st Seme. Examination

ZOOLOGY

PAPER—ZOO-103

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

(Immunology)

[Marks : 20]

1. Answer any *two* questions : 2×2

(a) What do you mean by Affinity and Avidity.

(b) Write the functional significance of
(i) Thymosin; (ii) Psoriosin; (iii) Hinge region; (iv) Perforin.

(c) State how viral interferences negatively regulate MHC expression.

(d) What are NK cells ? Mention its function.

2. Answer any *two* questions : 2×4

(a) (i) Write the properties of B-cell epitope.

(ii) What is superantigen ? 3+1

(b) Provide a comparative account of characteristics of MNC class I and Class II Peptide.

(c) Distinguish between Necrosis and Apoptosis with suitable diagram.

(d) (i) Write the principle of RIA.

(ii) What is Sandwich ELISA ? 3+1

3. Answer any *one* question : 1×8

(a) Write the principle, procedure and application of Southern Blotting Hybridization. What is hybridization probe ? $1\frac{1}{2}+4+1\frac{1}{2}+1$

(b) What are Antigen Presenting Cells (APC's) ? Give example. Discuss endogenous pathway of antigen processing and presentation with proper illustrations. 2+6

Group–B

(Methods in Biology)

[Marks : 20]

4. Answer any *two* questions : 2×2

(a) Which vector (Plasmid, Phage λ, Cosmid, Bacterial Artifical Chromosome) can be used to clone a continuous fragment of DNA with the following lengths ?

(i) 4 Kb; (ii) 35 Kb; (iii) 20 Kb; (iv) 100 Kb.

(b) Write the applications of Agarose Gel Electrophoresis.

(c) (i) State the role of lead citrate and uranyl acetate in the preparation of staining the specimen of TEM sample.

(ii) How many lenses are present in a TEM ? 1+1

(d) What is Biomagnification ? Give example.

5. Answer any *two* questions : 2×4

(a) (i) Write the principle of SDS-PAGE.

(ii) What is the composition of loading dye used in gel electrophoresis ?

3+1

(b) Describe the features of a phagemid vector with example.

(c) (i) State the utility of BLAST.

(ii) Write the principle of 2D gel electrophoresis.

2+2

(d) (i) How can you calculate the Rf value in TLC of a sample ?

(ii) How you prepare the TLC plate in a biological laboratory ?

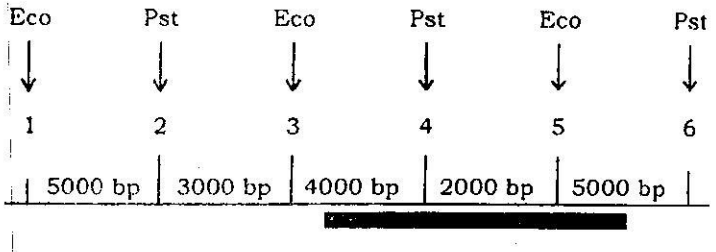
2+2

6. Answer any *one* question : 1×8

(a) (i) What is Bioremediation ? Describe ex-situ and In-situ bioremediation process.

(ii) Add a note on cell fractionation. 1+4+3

(b) The drawing below shows a restriction map of a segment of a DNA molecule. Eco refers to locations where the restriction endonuclease Eco RI cuts the DNA, and Pst refers to locations where the restriction enzyme Pst I cuts the DNA. Potential restriction sites are numbered 1–6. Distance between restriction sites are shown on the bottom scale in base pair (bp). The thick line represents the part of the molecule that has homology with a probe.



(i) Assume that individual 1 has restriction sites 1 through 6. If DNA is digested with Pst I, what are the expected size of the DNA fragments that will hybridize with the probe ?

(ii) Assume that individual 2 has a mutation that eliminates site 4. If DNA is digested with Pst I, what

are the expected sizes of the DNA fragments that will hybridize with the probe ?

(iii) Assume that individual 3 has a mutation that eliminates site 5. If the DNA is digested with Pst I, what are the expected size of the DNA fragments that will hybridize with the probe ?

(iv) If the DNA of individual 1 is digested with both Pst I and Eco RI what are the expected size of DNA fragments that will hybridize with the probe ?

(v) If the DNA of individual 3 is digested with both Pst I and Eco RI what are the expected sizes of the DNA fragments that will hybridize with the probe ?
