2022

1st Semester Examination

ZOOLOGY

Paper : ZOOL 103

Full Marks : 40 Time : Two Hours

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

Paper : 103.1

(Immunology)

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

   (a) Differentiate Affinity and Avidity with suitable diagrams.

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

   (ii) What is super antigen? 1½+½

   (c) Why does circulating IgM pentamer unable to activate complement system?

   (d) Write the functional significance of : ½×4

   (i) Psoriasin

   (ii) Thymosin

   (iii) Hinge Region

   (iv) IgA

P.T.O.

2. Answer any ***two*** of the following : 4×2=8

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

(b) (i) State the role of MBL in complement activation.

(ii) How does C4b ensure binding with pathogen surface? 2+2

(c) What are Antigen presenting cells (APC's)? Differentiate professional and non-professional APC's with example.

(d) (i) Distinguish between sequential epitope and conformational epitope.

(ii) Write the principle of sandwich ELISA. 2+2

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

(a) What do you mean by immunohistochemistry (IHC)? Name two repoter enzymes and their respective chromogenic substrate frequently used in IHC. Illustrate the direct and indirect IHC method with suitable diagram. Mention their applications. 2+4+2

(b) Write short notes (any ***two***) : 4×2=8

(i) Adjuvant

(ii) ADCC

(iii) Activation mechanism of classical complement pathway.

(iv) Titer

(v) MHC Class I and Class II

Paper : 103.2

(Methods in Biology)

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

   (a) Which genetic sequences must be present in a plasmid to be used as a cloning vector and how does it differ from expression vector?

   (b) What is the difference between T4 DNA ligase and *E.Coli* DNA ligase? For the use of bacteriophage lamda as cloning vector, which portion in its genome can be replaced with approximately 20kb of foreign DNA. 1+1

   (c) Write the composition of tracking dye in agarose gel electrophorasis. State the principle of SDS-PAGE. ½+1½

   (d) Differentiate between planner and column chromatography.

5. Answer any ***two*** of the following : 4×2=8

   (a) What is alpha complementation? Write the principle of blue and white selection of host bacteria during gene cloning technique. 1+3

   (b) State the advantages and limitations of affinity chromatography. Mention the application of southern blotting hybridization. 3+1

   (c) *Why a plasmid* containing bacterial origin of

replication cannot replicates in yeast or mammalian cells? What modification has been made in this plasmid for its replication in yeast and mammalian cell? Which selectable marker gene is present in yeast cloning/expression vector? 1+2+1

(d) What is Bioremediation? Describe in situ and ex-situ bioremediation process in brief. What are the physicochemical parameters responsible for biodegradation process? ½+2½+1

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

(a) Write the principle, procedure and application of Agarose gel electrophoresis. What are cation and anion exchanger in ion exchange chromatography? What is oil eating bug or super bug? 2+2+1+1+2

(b) (i) Write the components required to set up a PCR reaction.

(ii) What is RT-PCR and how it is performed?

(iii) If the Tm of a primer is 65°C, what would be its maximum annealing temperature in PCR?

(iv) What is real time PCR?

(v) In which step of real time PCR, the fluorescent intensity is measured when SYBR Green is used as fluorescent dye?

(vi) What is CT value? 2+2+1+1+1+1