

2022

M.Sc.

2nd Semester Examination

ZOOLOGY

PAPER—ZOO-202

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.*

*Illustrate the answers wherever necessary.*

**ZOO-202.1 BIOPHYSICS**

1. Answer any two questions : 2×2

(a) What is reverse osmosis? Give an example.

1+1

*(Turn Over)*

- (b) How could you calculate diffusion co-efficient ?
- (c) State the 2nd law of thermodynamics with example.
- (d) Classify membrane dynamics.

2. Answer any *two* questions : 2×4

- (a) Briefly describe the active and passive transport mechanism through cell membrane.
- (b) What is facilitated diffusion ? In short, write down the mechanism of activation of voltage gated  $\text{Na}^+$  channel present in neural cell membrane. 1+3
- (c) What is meant by resolving power of microscope ? How can you calculate angular ( $\theta$ ) resolution of microscope ? What is special resolution of microscope ? 1+2+1

- (d) Briefly describe and calculate the Reynold's number in the light of fluid dynamics of circulation.

3. Answer any *one* question : 1×8

- (a) What is the differences between equilibrium and non-equilibrium thermodynamics ? Describe the 1st law of thermodynamics with suitable example. Explain briefly the system model in thermodynamics. What is Gibbs free energy ?

2+3+2+1

- (b) What is Tyndall effect of colloidal solution ? Shortly discuss the classification of colloids. Calculate the sedimentation velocity ( $v$ ) in relation to Stokes drag force and gravitational force in the light of Brownian motion. Write down the clinical application of colloidal solution as a therapeutic treatment.

1+3+2+2

**ZOO-202.2      BIOCHEMISTRY**

4. Answer any *two* questions : 2×2
- (a) Why would it be unlikely to see an  $\alpha$ -helix containing only the following amino acids : Arg, Lys, Met, Phe, Trp, Tyr, Val ?
  - (b) State the significance of solvation layer in protein folding.
  - (c) State the difference between peroxisomal and mitochondrial  $\beta$ -oxidation.
  - (d) What is the difference between Type-I & Type-II  $\beta$ -bend ?

5. Answer any *two* questions : 2×4
- (a) Predict the order of elution when a mixture containing the following proteins are passed through a column containing a gel that excludes all proteins of MW 200,000D and higher.

Protein mixture contents :

Cytochrome C : MW 13000D

Tryptophan synthetase : MW 117,000D

Hexokinase : MW 96000D

ATP Sulfurylase : MW 440,000D

Glucose oxidase : MW 154,000D

Xanthine oxidase : MW 300,000D

- (b) Provide a detailed account of  $\beta$  domains with suitable diagrams.
- (c) State the structural complexities of any one fibrous protein of your choice.
- (d) In what ways electron moves within Q cycle? Explain with suitable diagram & flow chart.

6. Answer any one question : 1×8

- (a) How does protease – pancreatic chymotrypsin catalyses the hydrolytic cleavage of peptide bond. Illustrate the mechanism of enzyme action with proper diagrams.

- (b) (i) What do you mean by salting out?
- (ii) In what way polyunsaturated fatty acid oxidation differs from monounsaturated fatty acids?
- (iii) Explain why ATP act as a competitive inhibitor of hexokinase mediated phosphorylation. 2+4+2
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