

NAME:

ROLL NO:

LS2103. Class Test-3. 13.11.2024 Time: 15 MINUTES.  
Clearly tick ONLY ONE OPTION (single right answer).  
Negative marks for wrong/ambiguous selection.

Use back page for any rough work.

1. Fick's Diffusion Equation requires:

- a) A constant flux
- b) A sinusoidal concentration profile
- c) A non-zero curvature in concentration profile
- d) A constant Diffusion Coefficient

2. The Stokes-Einstein relationship:

- a) Connects a bulk property with a molecular property
- b) Assumes a spherical particle with fixed size
- c) Pertains to a system in equilibrium
- d) All of the above

3. Consider two different artificial systems, labelled 'A' and 'B', constructed with identical permeable membranes. The membrane separates 'intra-cellular (or IC) like' and 'extra-cellular (or EC) like' sides. The ion concentrations, given below, results in a potential difference ( $\Delta V$ ) across the membrane:

System	Ion	IC	EC
A	Na <sup>+</sup>	11 mM	2 mM
B	Cl <sup>-</sup>	2 mM	11 mM

Both (a) and (c) will be accepted.

- a) The same  $|\Delta V|$  will be required to offset ion diffusion in both systems
- b) System 'A' will require a 5.5 fold greater potential difference between IC and EC
- c) The same  $\Delta V$  will be required to offset ion diffusion in both systems
- d) The concentration difference between IC and EC is maintained naturally

4. The Reynold's number:

- a) Is a constant at fixed density and viscosity
- b) Is a constant at fixed diffusivity and temperature
- c) Depends on the speed and size of a moving particle
- d) Depends directly on concentration profile of the diffusing particles