stating the significance of various terms appearing in the expressions. Determine the value of diffusion constant in the velocity space using the Langevin expression. 4+3+3

UNIT – P-4152

3. Answer any *four* questions : 4×5=20

    a) Discuss the causes and effects of protein denaturation. What is the role of solvent on structure of a protein?

    b) Describe with illustration the double helix structure of DNA. What happens on viscosity of a solution containing DNA when it melts?

    c) What is active transport? Which macromolecule is considered as pumping device for active transport?

    d) What is the mechanism of nerve impulse generation and its propagation?

    e) What is stacking interaction? On which factors does stacking depend? Why heparin is more effective than DNA to stack dye molecules?

    f) What is the role of actin and myosin in muscle contraction?

M. SC. CHEMISTRY (SPECIAL SUPPLEMENTARY) EXAMINATION, 2023

(4th Semester)

PAPER: XV-P

[PHYSICAL CHEMISTRY SPECIAL]

Time : Two Hours   Full Marks : 40

(20 marks for each Unit)

Use a separate answer script for each Unit.

UNIT – P-4151

1. Describe the essential assumptions made by Einstein to formulate the Brownian motion. Derive the Einstein's expression in differential form to evaluate the distribution of Brownian particles in space and time. Evaluate the relation between mean displacement and time by using the following relation: $f(x,t) = \dfrac{n}{\sqrt{4\pi Dt}} e^{-x^2/4Dt}$ (The terms having their usual meaning). Show theoretically that the existence of random force is essential to observe Brownian motion and hence identify the characteristic nature of the random forces. $2 + 2\frac{1}{2} + 2\frac{1}{2} + 3$

2. Find a suitable relation to show that the random force is exactly counterbalanced by the viscous force with considering Langevin's description of Brownian motion. Deduce the expression for the change in particle density with time in velocity space under no external force field,