Duration: 2 hours **Total marks: 60**

N.B. All questions are compulsory
Numbers to the right indicate marks
Draw neat labelled diagram wherever necessary

Q.1 Answer any four of the following **16**

a Derive Henderson - Hasselbalch equation.

b Explain the Arrhenius Theory for acid and base.

c State the ionisation of water and explain with the reactions.

d Define the pH. Explain the concept of pH using an equation.

e Calculate the pH of 0.1 N acetic acid. Temperature is 24°C by using ionisation of the weak acid equation Ka = 1 .38 x 1 0 -4 .

f Explain the ionisation and titration curve of lysine and aspartic acid with the curve diagram

g Write a short note on Bronsted -Lowry Theory of acid and base.

h Calculate the pH of a solution in which $[H^+] = 8.0 \times 10^{-4}$ and [OH] = 4.0 x 10-2. State whether the solution is acidic, basic or neutral. The temperature is 24°C.

Q.2 Answer any four of the following **16**

a Write a short note on Kinetic & optical properties of colloids.

b Explain the relationship between surface tension & vapour pressure with a diagram.

c Gives the charcteristics of adsorption.

d Explain surface tension mechanism with diagram.

e Differentiate between osmosis and diffusion

f Define Adsorption. Describe the use of adsorption principle widely used in purification of enzymes.

g Explain the role of osmosis in hemodialysis.

h Elaborate on any four factors affecting viscosity.

Q.3 Answer any four of the following **16**

a Define a. Refractive Index b. Magnification

b Enlist any four parts of Microscope and state their functions.

c Write a short note on Fluorescent microscope.

d Explain the working principle of SEM

e State the principle and application of TEM

f What is Resolution & Numerical Aperture?

g What is Foldscope? Who invented it? Give its significance.

h State the role of Condenser, ocular lenses and stage of microscope.

Q.4 Answer any six of the following **12**

a Explain the following physiological buffers.
1.phosphate 2. Carbonate buffer

b State the relation between pka1 and pka2 of acids with an example.

c Calculate the $[OH^-]$ of the solution which is 0.001 N for HCl at 24·C by using the K_w equation.

d Calculate the pH of a solution in which $[H^+] = 4.5 \times 10^{-4}$. State whether the solution is acidic, basic or neutral. The temperature is 24°C.

e Define Osmotic pressure and state the mathematical expression for it.

f Explain capillary viscometer.

g Enlist any two biological significance of Donnan membrane.

h Write a short note on Precipitation of colloids.

i Explain the role of condenser in microscopy

j State any two limitations of Electron Microscope.

k Explain the advantages of fluorescence microscopy.

l State the principle of Cryo-Electron microscopy.

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