2020

BIOCHEMISTRY — GENERAL

Paper : SEC-A-1

(Tools and Techniques in Biochemistry)

Full Marks : 80

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer ***any ten*** questions : 2×10

(a) Define buffer.

(b) Define normality.

(c) What is the difference between normality and molarity?

(d) What is plane polarized light?

(e) What is fluorescence?

(f) What are the ranges of wavelengths of UV light and visible light?

(g) What is the unit of molar extinction coefficient?

(h) What is the role of photomultiplier?

(i) What is absorption maxima?

(j) What is chromophore?

(k) Define Beer's-Lambert's law.

(l) What is pH?

(m) What are the light sources used in UV-VIS spectrophotometer?

(n) What is cuvette?

(o) What is stock solution?

(p) What is the need to wear fully covered shoe while working in a biochemistry laboratory?

2. Answer ***any four*** questions : 5×4

(a) Prepare a standard curve from a stock of 10 ml of BSA solution of density 1 mg/100 ml.

(b) What will be the concentration of an unknown protein solution when it shows absorption at 280 nm of 0.3 when taken in a quartz cuvette of pathlength of 1 cm?
[Given epsilon value of the protein = 7.1×10^3 M^{-1} cm^{-1}]

(c) What are the good properties of a buffer?

(d) How will you store the different stock solutions of a biochemical laboratory?

(e) Write in brief the principle of UV-vis spectroscopy.

(f) Write in brief the principle of fluorescence spectroscopy.

(g) What are the safety measures one needs to take while working in a wet laboratory?

3. Answer ***any four*** questions :

(a) Write down the principle of Lowry method of estimation of concentration of a protein solution. Write the experimental procedure of Lowry method. Which colour is developed in this reaction product? Which instrument will you use to measure the intensity of thus found colour product of the reaction mixture? 3+3+1+3

(b) Deduce the Henderson-Hasselbach equation. Write the working principle of a pH meter. 5+5

(c) Write down the principle and procedure of estimation of concentration of unknown protein solution by BCA method. 5+5

(d) Write the notes on chemical hazards, biological hazard, electrical and mechanical hazards. 3+3+4

(e) Write down the equation of Lambert-Beer law. Mention the limitations of this law. Derive the relation between absorbance and transmittance. 3+4+3

(f) Draw the Jablonski Energy diagram for fluorescence spectroscopy. What do you mean by excited state lifetime of a fluor? Differentiate between internal and external fluorescence quenching with example. Write down the stern-Volmer equation. 3+2+3+2

(g) Draw a schematic diagram of UV-visible spectrophotometer.
How is a double beam spectrophotometer better over a single beam spectrophotometer? 6+4
