

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) What is a standard solution?
 - (b) What is a glass electrode? Mention its use.
 - (c) Describe the Henderson–Hasselbach equation.
 - (d) Differentiate between a normal and molar solution.
 - (e) Mention two differences between UV-visible and fluorescence spectroscopy.
 - (f) What is meant by an equivalent weight of a substance?
 - (g) What is buffer capacity?
 - (h) Why nucleotide absorb UV-light?
 - (i) What is the unit of molar extinction coefficient?
 - (j) Differentiate between a primary and secondary standard solution.
 - (k) Name one acidic and one alkaline biological buffer.
 - (l) What is buffer capacity?
2. Answer **any four** questions :
- (a) (i) Write down three laboratory safety measures.
 - (ii) How will you make a 10% solution of oxalic acid? 3+2
 - (b) (i) State Lambert-Beer's law.
 - (ii) Describe the working principle of a pH meter. 2+3
 - (c) Write down the principle and application of fluorescence spectroscopy. 5
 - (d) (i) Classify the following as primary or secondary standard :
 - A. Potassium dichromate
 - B. Sodium oxalate
 - C. Sodium hydroxide.
 - (ii) Between molarity and molality, which one is temperature independent and why? 3+2

Please Turn Over

- (e) (i) What is the basic principle of UV visible spectroscopy?
(ii) Name four basic components of a single beam UV/visible spectrum. 3+2

3. Answer **any four** questions :

- (a) (i) A solution of acetic acid ($pK_a = 4.75$) has a pH of 6.75. Determine the ratio of acid to its conjugate base.
(ii) A mixture of 0.2 M acetic acid and 0.3 M sodium acetate is given. Calculate the pH of the medium if the pK_a of the acetic acid is 4.76. 5+5
- (b) (i) What are the advantages of a pH meter over a conventional pH paper?
(ii) What is BCA assay?
(iii) Mention five safety precautions one must follow while working in a biochemical laboratory. 3+2+5
- (c) (i) What are the advantage and disadvantage of virtual laboratory?
(ii) Discuss the principle of buffer action for the buffer containing a weak acid HA and its metal salt, MA. 5+5
- (d) (i) What is the principle of Lowry protein estimation method? Mention the disadvantage of this method.
(ii) How will you prepare a 200 ml 5 M NaCl solution from a 10 M stock solution of NaCl? (3+2)+5
- (e) (i) Draw a simple diagram of an emission spectrophotometer.
(ii) Which assay is more sensitive Lowry or BCA?
(iii) Why BSA is used as a standard solution in protein estimation assay? 5+2+3
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