

2020

## BIOCHEMISTRY — HONOURS

Paper : CC-5

Full Marks : 50

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*

## Group - A

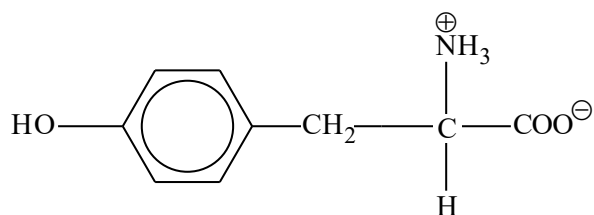
1. (a) What is Stokes shift in emission spectroscopy? Why is it observed?  
 (b) What is chemiluminescence? Give an example of a biological chemiluminescent molecule.  
 (c) How can you characterize the alpha helix and the beta sheet in a polypeptide spectroscopically?  
 (d) "It is not possible to measure absorbance values accurately above 3.0." — Justify or criticize the statement. 3+3+2+2

## Group - B

2. (a) Draw a simplified Jablonski diagram showing only the non-radiative transitions.  
 (b) Calculate the transmittance of a solution containing two samples A and B, which have individual absorbance values of 0.4 and 0.5 respectively. 2+3
3. (a) Which of the following molecules will be IR active during symmetric stretching and why?  
 (i) O<sub>2</sub>  
 (ii) CO  
 (b) Comment on the choice of solvent used in UV-vis spectroscopy. (1½×2)+2

## Group - C

4. (a) The UV spectrum of the amino acid given below, shows a red shift in its absorption maximum from 270 nm to 295 nm on increasing the pH of the medium. Justify this red shift with proper reasoning.



Please Turn Over

- (b) A certain sample absorbs 20% of the incident radiation in a cell of path length ' $l$ '. Calculate the fraction of the incident light absorbed by the same sample in a cell of path length ' $5l$ '.
- (c) Write the Stern–Volmer equation of quenching of fluorescence mentioning each term involved.

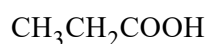
3+4+3

5. (a) State Fick's first law of diffusion.

(b) What is the S.I. unit of diffusion coefficient?

(c) On what factors does the diffusion coefficient of solute-solvent pair depend?

(d) Draw the simplified  $^1\text{H}$  NMR pattern of the following compound showing the multiplicity of each band :



2+1+3+4

6. (a) A protein, containing a tryptophan residue in its inner core, undergoes denaturation on treatment with a drug. How can this denaturation be followed spectroscopically? Explain with proper reasoning.

(b) What is Ramachandran plot? From this plot, comment on the relative occurrences of the right and left handed alpha helix in proteins.

(c) From the given IR spectral data, predict the structure of thioacetic acid with proper reasoning.

IR ( $\text{C}_2\text{H}_4\text{OS}$ ) – 2 sharp bands at  $1730\text{ cm}^{-1}$  and  $2600\text{ cm}^{-1}$ .

3+3+4

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