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DEPARTMENT OF PHYSICAL AND CHEMICAL SCIENCES  
FIRST SEMESTER 2019/2020 B.Sc EXAMINATIONS B

BCH 201- GENERAL BIOCHEMISTRY I

Time: 2 hrs

*Instruction: Attempt three (3) questions out of the five questions. Question 1 is compulsory and carries 30 marks.*

1. (a) Define pH
- (b) Why is pH important in Biology?
- (c) How can you determine the pH of a given solution?
- (d) Calculate the pH:
  - (i) of 0.5M HCl solution?
  - (ii) If 100ml of 0.32M of NaOH are added to 200ml of 0.200M HCl, what is the pH of the resulting solution?
- (e) What are buffers?
- (f) Define Buffer Capacity
- (g) At what point does a buffer works best?
- (h) From the reaction,  $HA \leftrightarrow H^+ + A^-$  ; Derive  $pH = pK_a + \text{Log} [A^-]/[HA]$ .
- (i) A buffer solution contains 0.5M acetic acid and 0.5M sodium acetate. Calculate the pH of the buffer ( $pK_a$  of acetic acid is 4.75).

30 marks

- (2a) Classify the 20 amino acids based on their essentiality..... 10 marks
- (2b) Describe the relationship between the molecular weight and number of residues of proteins..... 4 marks
- (2c) List six (6) basic functions of proteins..... .6 marks
- (3a) Giving correct example, write short notes on
  - (i) Epimers.....3 marks
  - (ii) Enantiomers.....3 marks
  - (iii) Anomers.....3 marks
  - (iv) Diastereoisomers.....3 marks

(3b) Draw the structures of Amylose and Amylopectin and state the differences between them.....8 marks

(4a) With specific examples, different between

- (i) Nucleosides and Nucleotides..... 4 marks
- (ii) DNA and RNA.....4 marks
- (iii) Monocistronic and Polycistronic gene.....4 marks

(4b) Briefly describe

- (i) Palindrome.....2 marks
- (ii) Hairpin.....3 marks
- (iii) Cruciform.....3 marks

(5a) Give two (2) examples each of 3, 4, 5, 6 and 7 - carbon sugars.....5 marks

(5b) With the aid of annotated diagrams only, describe

- (i) Enzyme.....2 marks
- (ii) Substrate.....2 marks
- (iii) Ezyme-substrate complex.....3 marks

(5c) Write short notes on the following;

- (i) Active site.....2 marks
- (ii) Enzyme inhibitors.....2 marks
- (iii) Activation energy.....2 marks
- (iv) Cofactors.....2 marks