CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATION

RESIT/SPECIAL EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (BIOCHEMISTRY)

BIOC 311: BIO MEMBRANES AND CELLULAR SIGNALING

STREAMS: **TIME: 2 HOURS**

DAY/DATE: TUESDAY 04/05/2021 **8.30 A.M – 10.30 A.M**

INSTRUCTIONS

- Answer question **ONE (COMPULSORY)** and any other **TWO** questions.
- Sketch diagrams may be used whenever they may help to illustrate your answer.
- Do not write anything on the question paper.
- This is a closed book exam. **No** reference materials are allowed in the examination room.
- There will be **No** use of mobile phones or any other unauthorized materials.
- Write your answers legibly and use your time wisely.

QUESTION ONE (30 marks) compulsory

a. With a use of a suitable diagram, demonstrate the role of trimeric G protein in cell signaling and transduction. (8 marks).

b. With a use of structure of epinephrine agonist (isoproterenol) and antagonist (alprenolol), discuss the role of ligand agonists and antagonists in medicine (8 marks).

c. Discuss four (4) types of lipids present in biomembranes (8 marks).

d. Explain six (6) properties of ion channels in the cell membranes (6 marks)

e.

QUESTION TWO (20 marks).

a. Illustrate the synthesis and hydrolysis of cAMP if the process of cell communication. (8 marks).

b. An essential role of biomembranes is to allow movement of all compounds necessary for normal function of cell across the cell membrane barrier. Discuss four (4) transport systems that facilitate the compounds such as sugars, amino acids, fatty acids, steroids, cations and anions to enter or leave the cells in an orderly manner for normal functioning of the cell. (8 marks).

a. Discuss the two effects of fluidity of a biomembrane. (4 marks).

QUESTION THREE (20 marks).

a. Demonstrate the formation of inositol 1,4,5 triphosphate and 1,2 – diacylglycerol used in α_1 –adrenergic G protein coupled receptor signaling in the liver. (8 marks).

b. In relation to cell membrane composition, discuss hereditary spherocytosis and hereditary elliptocytosis. (8 marks).

c. What is the difference between intercellular and intracellular signaling. (4 marks).

QUESTION FOUR (20 marks).

a. With a use of a well labeled diagram, demonstrate the formation and structures of a lipid bilayer biomembrane (5 marks).

b. Discuss four basic categories of chemical signaling found in multicellular organisms (8 marks).

c. Discuss the two main classes of proteins that participate in intracellular signal transduction. (7 mark