CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN CHEMISTRY

CHIN 431/CHEM 431: INDUSTRIAL PHARMACEUTICAL CHEMISTRY

STREAMS: BSC. CHEM **TIME: 2 HOURS**

DAY/DATE: FRIDAY 25/04/2025 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS

- Answer Question **ONE** and any other **TWO** Questions

QUESTION ONE (30 MARKS)

a) Differentiate the following terms:

i) Principle of selective toxicity and Therapeutic index (2 marks)

ii) Pharmacodynamics and Pharmacokinetics (2 marks)

iii) Drug and medicine (1mark)

b) i) Define enzymes (1 mark)

ii) Write the enzyme catalyzed reaction between pyruvic acid to lactic acid catalyzed by lactate dehydrogenase (3 marks)

c) Discuss acid/base catalysis using the amino acid histidine (4 marks)

d) i) Define a neurotransmitter (1 mark)

ii)Draw the neurotransmitters acetylcholine and dopamine (2 marks)

e) Differentiate between:

i. Reversible and irreversible inhibitors (2 marks)

ii) Competitive inhibitor and uncompetitive inhibitor (2 marks)

f) Explain the term suicide substrates (2 marks)

g) Write the chemical equation for metabolism of prontosil to sulphanilamide (3 marks)

h) Draw a well labelled structure of penicillin and indicate R for benzyl penicillin and pehenoxymethylpenicillin (5 marks)

QUESTION TWO (20 MARKS)

a) Discuss the following intermolecular bonding forces:
   i. Dipole-dipole and ion-dipole interactions (3 marks)
   ii. Van der waals interactions (3 marks)

b) Give three ways in which enzymes catalyze reactions (3 marks)

c) Using an example, discuss intercalating drugs acting on DNA (2 marks)

d) I) Draw the general structure of sulphanilamide analogues (1mark)
II)Write the conclusions of the structure-activity relationship of sulphonamide (3 marks)

e) Using a suitable equation discuss the β-lactamase deactivation of penicillin (3 marks)

f) Differentiate between bacteriostatic and bactericidal agent (2 marks)

QUESTION THREE (20 MARKS)

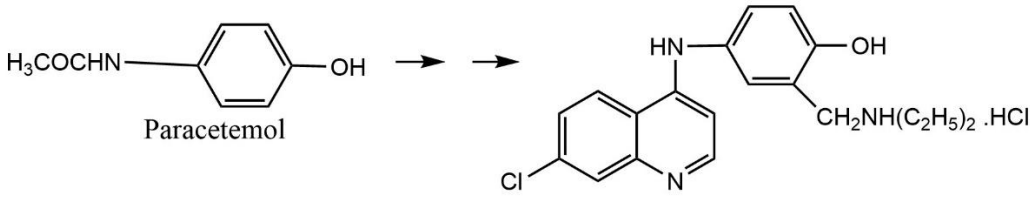
a) Discuss three main ways in which drugs might be classified or grouped (6 marks)

b) Discuss the tertiary structure of proteins (3 marks)

c) I) Explain the active site of an enzyme (2 marks)
II)Discuss the Koshland's theory of induced fit (2 marks)

d) Discuss the semi-synthetic procedure for the synthesis of penicillin using a suitable equation (3 marks)

e) Write the mechanism of the synthesis of amodiaquine HCl starting from paracetamol or any other reagents (4 marks)



Paracetemol

Amodiquine HCl

QUESTION 4 (20 MARKS)

a) I) Define a lead compound (2 marks)

II)Discuss the following sources of lead compounds using an example (6 marks)

i. Microorganisms
ii. Marine sources
iii. Venoms and toxins

b) Discuss the secondary structure of proteins (4 marks)

c) Explain the term topoisomerase poisons (2 marks)

d) Discuss two mechanisms of antibacterial agents (4 marks)

e) Discuss the structure-activity relationship of penicillins (2 marks)

……