



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE & APPLIED SCIENCES
2021_1 EXAMINATION

COURSE CODE: CHM 421

CREDIT: 2 Units

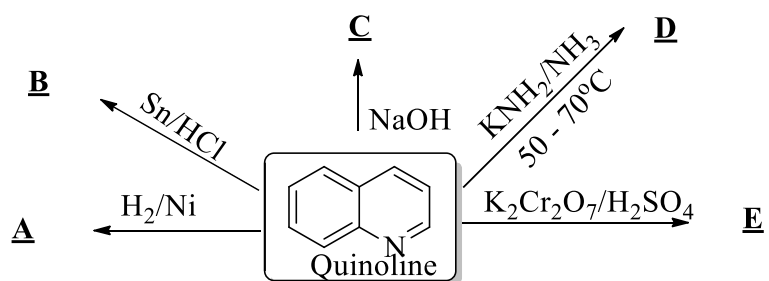
COURSE TITLE: HETEROCYCLIC CHEMISTRY **TIME ALLOWED: 2 Hours**

INSTRUCTION: Answer Question ONE (1) and any other Three (3) Questions

- Q1. a) Give a detail account of Chichibabin-type reaction of quinoline (5 marks)
b) State the general physical properties of indole (5 marks)
c) With scheme alone, show conversion of indole to 3-chloropyridine (5 marks)
d) Give account on discovery of chloroquine (5 marks)
e) Provide structure of warfarin and its three brand names (5 marks)
- Q2. a) Expatiate on general physical properties of quinoline (5 marks)
b) State advantage of modified Pomeranz-Fritsch synthesis of isoquinoline (5 marks)
c) List the starting materials required for Reissert Synthesis of indole (5 marks)
d) Provide products of nitration of benzofuran with N_2O_2 in benzene at $0^\circ C$ (5 marks)
e) What are two uses of Raloxifene and the name of heterocycle in it (5 marks)
- Q3. a) In not more than 4 lines, explain what Fischer-Indole process entails (5 marks)
b) Using scheme only, outline the synthesis of nicotinic acid from quinoline (10 marks)

Q4. Provide the structures of **A** to **E** in the reactions of quinoline below

(15 marks)



Q5. Outline scheme for synthesis of chloroquine using Conrad-Limpach approach (15 marks)