WI-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS 2025/2026**

YEAR 1 SEMESTER 1 EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN MEDICINAL CHEMISTRY

TPS 3101: DRUG METABOLISM

DATE: AUGUST 2026 TIME: 3 HOURS

INSTRUCTIONS: Answer any Four (4) questions: [Each is 25 marks]

1. Drug absorption and drug metabolism are key components that predict how much active metabolite reaches its target site [25 Marks]
    i. Discuss mechanisms, route, and factors affecting drug absorption [12 marks]
    ii. Discuss sites of drug metabolism, the phases with relevant examples of reactions involved, and factors influencing drug metabolism [13 marks]

2. Cytochrome P450 is a superfamily of membrane-bound hemoprotein isozymes that play a role in drug metabolism.

    i. Describe the basic biochemical features [4 Marks]
    ii. Summarize their distribution in the body [4 Marks]
    iii. Describe genetic variations [4 Marks]
    iv. Discuss the pharmacological role of CYP2 and CYP3 families [13 Marks]

3. A prodrug is a poorly active or inactive compound containing the parent drug that undergoes *in vivo* biotransformation via chemical or enzymatic cleavage in order to deliver the active molecule at efficacious levels. Discuss how Carbonate, Carbamate, Amide, and Ester prodrugs have been used to improve drug solubility [25 marks]
4. Drug metabolism plays an important role in drug discovery and development, and its effects on pharmacokinetics (PK), pharmacodynamics (PD), and safety should be carefully considered. Discuss how these drug metabolism strategies have been explored to improve PK/PD and safety profiles of drug candidates
    i. Metabolic soft spot [13 marks]
    ii. Metabolic switching and deuterium replacement [12 marks]

5. Discuss the main process involved in drug discovery and development
    i. Discovery of a hit and lead molecule [5 marks]
    ii. Preclinical development [5 marks]
    iii. Clinical trials [10 marks]
    iv. Post Clinical Trials/ Post-marketing surveillance [5 marks]
6. Given a drug molecule X indicated for condition Y, using Pharmacokinetic/Pharmacodynamic (PK/PD) Modeling, discuss an experiment that would help identify factors (host, pathogen, and drug) affecting their optimum plasma level [25 marks]