NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF INFORMATICS AND ANALYTICS

HEALTH INFORMATICS II

SCI4202

SECOND SEMESTER

2025

This examination paper consists of 3 pages.

Time Allowed: **3 hours.**

Total Marks: **100**

Special Requirements: **None**

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External Examiner: **Dr L. Sakala**

INSTRUCTIONS

Answer **ANY FOUR** questions. Each question carries 25 marks.

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
Possible total marks	100

QUESTION ONE

a) The primary purpose of a clinical decision support system (CDSS) is to provide **timely information** to clinicians, patients, and others to **inform them of healthcare decisions**. The CDSS can **potentially lower costs**, **improve efficiency** and **reduce patient inconvenience**. Outline how the CDSS addresses the highlighted areas. [5]

b) Explain two techniques software engineers can use to acquire requirements for a CDSS. [5]

c) A healthcare provider in a rural region plans to implement an IoT-enabled Remote Patient Monitoring (RPM) system to manage chronic diseases like diabetes and hypertension. The system uses wearable devices (e.g., glucose monitors and ECG patches) and telehealth platforms. Analyse any **two** benefits and any **two** technical challenges of deploying IoT-based RPM in this setting. [10]

d) Evaluate the ethical and security risks associated with this IoT-RPM system. [5]

QUESTION TWO

A hospital implements an AI system based on predictive analytics to prioritise emergency room (ER) admissions. The model uses historical patient data to assess urgency. After deployment, audits reveal that the system disproportionately deprioritises elderly patients from low-income neighbourhoods, leading to delayed care.

a) Analyse the ethical dilemmas in this scenario by identifying which core principles (autonomy, beneficence, non-maleficence, justice) are violated. Provide specific examples. [8]

b) Evaluate the technical and systemic root causes of the bias in the AI system. [9]

c) Propose **four** strategies to mitigate ethical risks in future AI deployments. [8]

QUESTION THREE

A tertiary care hospital reports high clinician burnout linked to its EHR system. The hospital seeks to redesign its EHR system to align with UX principles.

a) Evaluate how poor EHR usability contributes to clinician burnout. [8]

b) Discuss any **seven** UX principles that can assist with mitigating clinician burnout. [14]

c) Propose **three** Key Performance Indicators (KPIs) to measure the successful redesign of the EHR. [3]

QUESTION FOUR

Life Hospital has hired your team to develop a new patient portal. The portal must also seamlessly integrate with Life Hospital's existing internal systems, including its Electronic Health Record (EHR).

a) Outline any **five** critical challenges or considerations the hospital must address before implementing the portal. [5]

b) Explain any **five** key features of effective patient portals. [10]

c) Propose **five** patient engagement strategies for portal adoption and use. [10]

QUESTION FIVE

a) A local hospital recently experienced a significant data security breach, exposing thousands of patients' personal and medical information. This incident has raised serious concerns about the security of patient data in healthcare settings. The hospital administrator has proposed the adoption of blockchain technology. Critically evaluate the potential limitations or challenges of implementing blockchain solutions in healthcare settings. [10]

b) Country Z's health authorities are concerned about recurring cholera outbreaks. Design a surveillance system for a specific province to effectively track and minimise the spread of cholera in the future. [15]