Institute of Information Technology
University of Dhaka
Bachelor of Science in Software Engineering (BSSE)
2nd Year 4th Semester Mid Examination, 2025
CSE 2215L : Design Patterns Lab
Marks: 100 # Duration: 1.5 hours

You are enhancing the Patient Record Generator in a Hospital Management System. Currently, the system supports a few departments: Cardiology, Neurology, and Orthopedics. Each department generates a custom record format based on the patient's diagnosis, tests, and notes. Use the patterns mentioned below to refactor the existing code (attached in Google Classroom's instruction).

Available Patterns:

- **Factory Method** — Create department-specific record instances.
- **Builder** — Construct complex records step-by-step with optional sections (summary report or detailed report).
- **Prototype** — Clone template record objects if departments share base formats.
- **Singleton** — Provide a shared configuration or record ID generator used across records.

Expected Outcomes After Refactoring:

- New departments (e.g., Dermatology) can be added by simply creating new classes — no changes to core logic.
- The PatientRecordService no longer contains any if-else checks or string comparisons.
- Logic for formatting, building, and cloning records is decoupled from the main service.
- A factory-based system dynamically selects the correct implementation (polymorphism) for displaying the detail of the record.

Marks Distribution:

Only one pattern implemented	25%
Factory/Building + Singleton/Prototype	50%
Factory + Builder	60%
Factory/Builder + Singleton + Prototype	70%
Factory + Builder + Singleton/Prototype	80%
All four patterns implemented	100%