

UNIVERSITY EXAMINATIONS

1ST SEMESTER 2022/2023 ACADEMIC YEAR

THIRD YEAR EXAMINATION FOR THE DEGREES OF
BACHELOR OF SCIENCE (COMPUTER
SCIENCE)/BACHELOR OF SCIENCE (ICT)

BICT 311/COMP 312: SOFTWARE ENGINEERING

STREAM: R

TIME: 2 HRS

DAY: MONDAY [8.30AM- 10.30AM] DATE: 19/12/2022

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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INSTRUCTIONS: - Answer Question ONE and any other two questions

QUESTION ONE – COMPULSORY [30 Marks]

- (a) Describe in brief how a Scrum Sprint is carried out. (5 marks)
- (b) (i) Differentiate between user requirements and system requirements (2 marks)
- (ii) Give two examples each of functional requirements and non-functional requirements in relation to requirements engineering. (2 marks)
- (iii) Describe two methods you would use to gather requirements for a new website project. (4 marks)
- (c) Briefly explain the following elements of a Use Case description: Preconditions, Triggers, Main success scenarios, Alternative paths. (4 marks)
- (d) Give an example of a safety-critical software system and indicate the recommended software development model you would recommend for such a system with justification. (5 marks)
- (e) What are the main objectives of software security engineering? (5 marks)
- (f) How is human centred design different from other software design methods? (3 marks)

QUESTION TWO [20 Marks]

- (a) (i) Describe the phases of the Waterfall SDLC and indicate the deliverables of each phase. (5 marks)
- (ii) What are key difficulties associated with the Waterfall SDLC? (3 marks)
- (b) How is prototyping used in the Spiral SDLC? (5 marks)
- (c) (i) Discuss the motivation for Agile software development methods? (3 marks)
- (ii) What are the four priorities of Agile software development according to the Agile Manifesto? (4 marks)

QUESTION THREE [20 Marks]

- (a) Briefly explain the main activity in each of the following requirements engineering steps:
Requirements Specification, Requirements Elicitation, and Requirements Validation.
(6 marks)

- (b) Create a simplified Use Case diagram for the following scenario:

A system is to be designed to allow **lecturers** to book and borrow computer lab equipment for teaching purposes. Lecturers can select the equipment they need and book it. If available, the booking is confirmed by the system else they are placed on a waiting list. On the day and time specified in the booking, the lecturer can check out the equipment and, after use, check it back in (return it). The **lab technologists** will confirm the condition of the equipment on check out and on check in to identify any issues such as damage. (4 marks)

- (c) Briefly describe two fundamental approaches to requirements elicitation and indicate the shortcomings of each approach. (5 marks)
- (d) Outline the key parts or sections of a requirements document. (5 marks)

QUESTION FOUR [20 Marks]

- (a) Differentiate between monolithic and distributed software architectural styles and give two examples of each style. (4 marks)
- (b) Explain how a Model-View-Controller is implemented in a typical web application. (5 marks)
- (c) What are the steps involved in object-oriented design? (4 marks)
- (d) Identify the classes in the following scenario and sketch a **class diagram** to represent the system described showing the appropriate **relationships** between the classes:

A system is to be designed to allow lecturers to borrow computer lab equipment for teaching purposes. Lecturers can select the equipment they need and book it. If available, the booking is confirmed by the system else they are placed on a waiting list. (7 marks)

QUESTION FIVE [20 Marks]

- (a) Differentiate between software verification and validation. (2 marks)

- (b) Briefly explain the meaning of the following software dependability features and give one example of a software system in which the feature is crucial.
- (i) Availability (2 marks)
 - (ii) Reliability (2 marks)
 - (iii) Safety (2 marks)
 - (iv) Security (2 marks)
 - (v) Resilience (2 marks)
- (c) (i) What is meant by “quality in use” as defined by ISO/IEC 25010:2011 software quality standard? (2 marks)
- (ii) Explain the **Performance Efficiency** and **Usability** by listing and briefly explaining two parameters or metrics used to measure each of these two quality characteristics. (6 marks)

