KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR
FOURTH YEAR, FIRST SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KCS 405 – ADVANCED SOFTWARE ENGINEERING

Date: 12TH April 2024
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS
QUESTION ONE (30 MARKS)

a) Define the following terms as used in software engineering:
   i) Software product (1 Mark)
   ii) Software engineering (1 Mark)
   iii) Software quality (1 Mark)
b) Provide four reasons that justify the need of having a project scope. (4 Marks)
c) Highlight four guidelines when developing a work breakdown structure. (4 Marks)
d) Conversion is a process of migrating from the old system to a new one. Using illustrations, discuss the four conversion strategies that may be applied by an organization. (4 Marks)
e) Consider a restaurant where customers can have a meal, either lunch or breakfast. Suppliers of the restaurant provide supplies, prospective candidates for a job can apply for a job, advertisers can advertise the restaurant, and contractors are able to supply and repair appliances. As a system analyst, you have been requested by the Restaurant owners to develop an information system for their business. Sketch a use case diagram for the system (5 Marks)
f) A project manager has drawn up a list of activities, their predecessors and their likely duration for a project at hand.

Task	Duration (Working Days)	Predecessor/s
A	5	None
B	15	A
C	25	B
D	15	B
E	13	B,D
F	6	C,D
G	10	E,F
H	5	G
I	5	H

The project manager decides to use Critical Path Method for the project management.
   i) Implement a network diagram for the project (5 Marks)
   ii) Determine the project duration in weeks assuming that each week has 5 working days.(2 Marks)

iii) Calculate the slack duration for the non-critical activities. (2 Marks)
iv) Determine the Critical path (1 Mark)

QUESTION TWO (20 MARKS)
a) Describe the following:
   i) Reverse engineering (1 Mark)
   ii) CASE tools (1 Mark)
   iii) Software pathology (1 Mark)
   iv) Total quality management (1 Mark)
b) Software project management is a key area in software engineering. Explain three reasons for the importance of software project management (6 Marks)
c) Using an illustration, describe how a Work Breakthrough Structure (WBS) is a suitable method for Time estimation in Software Development (4 Marks)
d) Explain the size oriented and functional oriented metrics in context of software development productivity estimation (6 Marks)

QUESTION THREE (20 MARKS)
a) Real software processes are inter-leaved sequences of technical, collaborative and managerial activities. Describe the four main process activities applicable in every software process. (8 Marks)
b) Software design deals with bringing the ideological concept of software into life. Discuss the three levels of system design (6 Marks)
c) Compare and contrast the Empirical estimation techniques and Heuristic techniques as applied in software project management. (6 Marks)

QUESTION FOUR (20 MARKS)
a) Differentiate between the following in relation to the properties of quality software.
   i) Portability and Usability (2 Marks)
   ii) Maintainability and Scalability (2 Marks)
   iii) Co-existence and Interoperability (2 Marks)
b) Discuss three requirements elicitation techniques, highlighting an advantage and a disadvantage for each technique. (6 Marks)
c) Software engineers shall commit themselves to the development of software a beneficial and respected profession. In accordance with their commitment to the health, safety and welfare of the public, highlight eight principles software engineers are required to adhere to. (8 Marks)

QUESTION FIVE (20 MARKS)
a) Differentiate the following concepts in system design
   i) Cohesion and Coupling (2 Marks)
   ii) Encapsulation and polymorphism (2 Marks)
   iii) Top down and bottom-up approaches (2 Marks)
b) Identify six important properties of a good software requirement specification document. (6 Marks)
c) Modular design unintentionally follows the rules of "divide and conquer" problem-solving strategy this is because there are many other benefits attached with the modular design. This type of design is achieved through coupling and cohesion. Describe four types of cohesion and four types of coupling. (8 Marks)