



**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR SEPTEMBER/DECEMBER 2021/2022 FOR BACHELOR OF  
SCIENCE IN COMPUTER SCIENCE**

COURSE CODE: RCS 104

DATE \_\_\_\_\_

TIME: 2 HOURS

**GENERAL INSTRUCTIONS:**

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

**SPECIAL INSTRUCTIONS:**

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

- 1. PLEASE start the answer to EACH question on a NEW PAGE.**
- 2. Keep your phone(s) switched off at the front of the examination room.**
- 3. Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
- 4. ALWAYS show your working.**
- 5. Marks indicated in parenthesis i.e. ( ) will be awarded for clear and logical answers.**
- 6. Write your REGISTRATION No. clearly on the answer booklet(s).**
- 7. For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
- 8. DO NOT use your PHONE as a CALCULATOR.**
- 9. YOU are ONLY ALLOWED to leave the exam room 30minutes to the end of the Exam.**
- 10. DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.**

## SECTION A (COMPULSORY)

### QUESTION 1 (30 MARKS)

- a) List and describe any *three* types of *information systems*. (2)
- b) List any *two* personal characteristics of a good Software Project manager. (6)
- c) What is the difference between *1NF* and *2NF*, in relation to database normalization? (4)
- d) In reference to the Systems Development Life Cycle (SDLC), identify only *one* deliverable for each of the following phases.
  - (i) Planning. (1)
  - (ii) Testing (1)
- e) User involvement is a critical step for the success of Information Systems projects. Give one reason for this. (1)
- f) What role do the CASE tools play in the development of large software projects? (2)
- g) Differentiate between *Rapid Applications Development* and *Xtreme programming*? (4)
- h) What role does prototyping play in the “*User Interface Design*” process? (2)
- i) Karura Community Medical Centre serves the needs of the local community. When a patient calls the medical center’s outpatient clinic and makes an appointment for a yearly checkup, the receptionist finds the nearest empty timeslot in the appointment book and schedules an appointment for that time slot.  
*Required: Generate a use case diagram for this scenario.* (5)
- j) Highlight any *two* attributes of a good software design. (2)

## **SECTION B (Answer ANY Two Questions)**

### **QUESTION 2 (20 MARKS)**

#### **Case Study: Housing Finance Cooperation (HCF)**

HFC (Housing Finance Cooperation) is a company offering house building and property improvement services to the public. The company employs a number of skilled workers such as bricklayers, carpenters and plumbers. The company manages the building projects, and may occasionally help with the construction work. HFC wants to computerize the management of building work. This includes processing of estimates, job scheduling, and payments as described below in more detail. When a customer contacts the company to ask for an estimate, the company makes a note of the customer's contact details and an outline of the proposed work. They agree a date with the customer to view the property in order to give an estimate of the cost for the work. When visiting the property on the agreed date, the company adds more detail to the outline of the proposed work. Within five days of visiting the property, HFC produces a fully detailed estimate and sends it to the customer. If the customer agrees to the estimate, the company schedules a date to start the job (this is based on the size of the job and other jobs that have already been scheduled). A few days before the agreed start date of a job, HFC contacts the customer to confirm the start date, and then orders the required building materials from suppliers to be delivered on the date the job starts. At the end/completion of the job, HFC calculates the actual cost of the job to produce an invoice which is sent to the customer. The customer is normally given sixty days to clear the invoice, either by cash deposit or cheque payment.

- a) Produce a top level data flow diagram representing the management of building jobs in HCF Company. **(6)**
  
- b) It is important that software systems work with clean, valid data. When modelling this system, how can the User Interface be designed to help ensure that the data entered by the user is valid? Give five ways of accomplishing this. **(5)**

c) The table below shows an example of a list of jobs which have been carried out recently.

<b>Job code:</b> G3	<b>Job description:</b> General- internal	<b>Customer No.:</b> 23	<b>Customer name:</b> J Smith
	<b>Material code:</b> B2	<b>Material name:</b> Bricks- standard	<b>Quantity:</b> 100 packs
	<b>Material code:</b> C3	<b>Material name:</b> Cement - Portland	<b>Quantity:</b> 40 kg
	.....	.....	.....
<b>Job code:</b> B2	<b>Job description:</b> General -bath	<b>Customer No.:</b> 12	<b>Customer name:</b> G Holmes
	<b>Material code:</b> T3	<b>Material name:</b> Tiles-standard	<b>Quantity:</b> 10 packs
	....	.....	....
<b>Job code:</b> K1	<b>Job description:</b> Basic -kitchen	<b>Customer No.:</b> 17	<b>Customer name:</b> B Brown
	<b>Material code:</b> P8	<b>Material name:</b> Paint -prof.	<b>Quantity:</b> 10 litres
	.....	.....	.....
	.....	.....	.....

d) Normalize the table to produce a set of relations in 3NF. Show all of your working, explaining each step. (9)

### QUESTION 3 (20 MARKS)

#### Case Study: Broadways Ltd

Broadways Ltd is a small, independent business that sells exotic loaves of breads and cakes to the public. The proprietor is very keen on baking and specializes in making homemade loaves of breads and cakes for sale in the shops. As well as making much of the confectionery sold in the shop, the proprietor also buys loaves of breads and some cakes from suppliers to increase the range of products for sale. At the end of each day the proprietor reviews the sales of the homemade items. He then decides how many loaves of breads and cakes to make for the next day. This is also partly to replenish any stock that needs to be bought from suppliers, and also to keep track of the sales. Once a week, the proprietor checks the stock to dispose of anything that is past its 'use by' date. He also checks to see if any raw ingredients for the homemade products, or any pre-made loaves of breads and cakes need to be ordered from the suppliers. The proprietor orders supply on a Cash On Delivery basis, so all deliveries are paid for immediately.

The company's management has invited a system analyst who will assist in the development of an Information System that will fully automate the business processes at Broadways Ltd.

- a) In reference to the above scenario, list any *two* specific roles that a system analyst will play in the process of developing the new information system. (4)
- b) Explain any *three* data collection methods that can be used during analysis. (6)
- c) Represent the scenario of the Broadways Ltd with an *E-R diagram*. (4)
- d) Explain any *three* changeover methods that can be used to implement the newly developed Information System for this company. (6)

#### QUESTION 4 (20 MARKS)

##### Case Study: Xps Oil Recommender System

“Xps Oil Recommender System” is a system that assists mechanics in making decisions about the type of gear box oil that they will put in a car during the gear box oil service procedure, depending on the model and usage of any particular car. If the car’s model is Mercedes, then the type of gear box oil to be put on the car is automatically *synthetic oil*, regardless of whether the car is used for short or long-distance trips. If the car’s model is Toyota and the car is normally used for long distance trips, then the type of gear oil to be used for this particular car is *synthetic oil*. If the car is Toyota and the car is normally used for short distance trips, then the type of gear oil to be used for this car is *non-synthetic oil*. If the car’s model is Mazda, then the type of gear box oil to be used is *non-synthetic oil*, regardless of whether they are used for long or short distance trips.

- a) List and explain any three elements of a system. Use relevant examples from the above information system. (12)
  
- b) Create a decision tree to represent the above scenario. (8)

## QUESTION 5 (20 MARKS)

### Case Study: Freelance Insurance System

The purpose of the Freelance Insurance System is to provide automotive insurance to car owners. Initially, prospective customers fill out an insurance application, which provides information about the customer and his or her vehicles. This information is sent to an agent, who sends it to various insurance companies to get quotes for insurance. When the responses return, the agent then determines the best policy for the type and level of coverage desired and gives the customer a copy of the insurance policy proposal and quote.

- a) Using relevant examples from the above scenario, explain the difference between *functional* requirements and *non-functional* requirements for such an information system. **(10)**
- b) Draw an activity diagram, *with swim lanes*, based on the above scenario. **(10)**