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University Examinations 2013/2014

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE IN BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

BIT 2214- OBJECT ORIENTED SYSTEMS AND DESIGN

DATE: APRIL 2014   TIME: 2HOURS

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – 30 MARKS

(a) Describe notations used in collaboration diagram.   (4 marks)

(b) List and explain any four component diagram stereotypes.   (4 marks)

(c) Given the following scenario, draw a statechart diagram.   (4 marks)

We track current customer status to help avoid uncollectable receivables and identify customers worthy of preferred treatment. All customers are initially set up as prospects, but when they place their first order,they are considered to be active.

If a customer doesn't pay an invoice on time, he is placed on probation. If he does pay on time and has ordered more than Kshs 100,000 in the previous six months, he warrants preferred status. Preferred status may be changed only if the customer is late on two or more payments. Then he returns to active status rather than probation, giving him the benefit of doubt based on his preferred history.

(d) Discuss any four UML diagrams.   (4 marks)

(e) Explain any four functions of Use case diagram.   (4 marks)

(f) Explain the concept of abstraction in object oriented programming.   (1 mark)

(g) Using examples of your choice draw the following diagrams.   (4 marks)

     i.   Collaboration diagram

     ii.   State diagram

(h) Illustrate and discuss the RUP development process framework.   (4 marks)

(i) Explain the importance of Modeling in OOA & D.   (1 mark)

QUESTION TWO –20 MARKS

(a) Figure below has a class hierarchy with a superclass and two subclasses Group and Polygon. Write Java code snippet for implement the model.   (4 marks)

(b) Compare and contrast the following :   (2 marks)
   (i)   Sequence diagram and statechart diagram   (2 marks)
   (ii)   Collaboration diagram and activity diagram   (2 marks)
   (iii)   Interface and implementation   (2 marks)

(c) List and explain all UML building blocks.   (8 marks)

QUESTION THREE – 20MARKS

(a) Explain the two following concept of object oriented programming: (3 marks)
   (i)   Polymorphism
   (ii)   Encapsulation
   (iii)   Data abstraction

(b) Describe approaches to identify classes from a given scenario.   (3 marks)

(c) Differentiate between :   (4marks)
     i.   Pattern and framework
     ii.   Booch and Jacobson Methodologies

(d) Attribute or operation lists in a class may be organized into groups with stereotypes. List and describe any such five.   (5 marks)

(e) Read the following narrative then answer the questions that follow.

A student is registered once his certificates have been verified to conform to the admission criteria for university admission. After that a student is either on session, on academic leave or graduate. A student is on session once he is registered for a new semester and has paid the full fees for that semester, otherwise on academic leave once the leave application has been granted. A graduate student is one who has successfully completed all the required course units, has passed and finished all the fee requirements.

    i.   Draw a state diagram.   (5 marks)

QUESTION FOUR – 20MARKS

(a) Compare and contrast at least any four characteristics of Object diagram and a state diagram.

                      (4 marks)

(b) Describe using an example all the notations used in an Activity diagram.   (4 marks)

(c) Given the following scenario, model the sequence diagram of the described activities using all notations.   (8 marks)

    Step 1 and 2   : Mr.Sigirso creates an order
    Step 3   :Mr. Sigirso tries to add items to the order
    Step 4 and 5   : Each item is checked for availability in inventory.
    Step 6 and 7   : If the product is available, it is added to the order.
    Step 8   : He finds out that everything worked.

(d) Given the following use cases statements, identify and draw class diagrams, existing relationships, roles and multiplicities: (4marks)

    (i)   An insurance company has insurance contracts, which refer to one or more customers.

    (ii)   A customer has insurance contracts (zero or more), which refer to one insurance company.

    (iii) An insurance contract is between an insurance company and one or more customers. The insurance contract refers to both a customer (or customers) and an insurance company

    (iv)   The insurance policy expresses an insurance contract.

QUESTION FIVE – 20MARKS

(a) Read the following carefully and answer the questions that follow:

Isiolo District Hospital operates in such a way that doctors visit various patients in the wards. Details about the doctor such as doctor's number, names, area of specialization and numbers of years of experience are recorded. The patient's names, sickness, next of kin are also recorded. After that, the patient is usually assigned a number. A doctor normally visits many patients in the wards on a given day; however a patient is usually assigned to a specific doctor. A patient is usually attended to in a particular ward. A ward may consist of between 5 and 10 patients at any one given time. The ward number, name, location and its capacity are recorded. Nurses are attached to various wards in the hospital. A ward can consist of many nurses at any one given time, but nurses will always be attached to only one ward.

    i.   Identify suitable classes.   (4 marks)

    ii.   Draw the corresponding class diagrams that include appropriate relationships and multiplicities.   (4 marks)

(b) Sequence and collaboration diagrams are examples of interaction diagrams. Briefly discuss including all their notations and the differences between these two types of diagrams.   (5 marks)

(c) List any four benefits of Object Orientation.   (4 marks)

(d) Draw a use case diagram to model the interaction with an ATM system.   (3 marks)