Kasarani Campus
Off Thika Road
Tel. 2042692 / 3
P. O. Box 49274, 00100
NAIROBI
Westlands Campus
Pamstech House
Woodvale Grove
Tel. 4442212
 Fax: 4444175

KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR
THIRD YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 12th August, 2016.

Time: 8.30am – 10.30am

KCS 307   - OBJECT ORIENTED ANALYSIS AND DESIGN

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a)   For each of the following relationships indicate whether it is an aggregation or composition;

      i)   Student and results
      ii)   Railway carriage and train
      iii)   Student and class
      iv)   Book and pages

                                            (4 Marks)

b)   Describe the following terms in relation to an object citing examples for each;

      i)   Member variable
      ii)   Member functions
      iii)   Identity
      iv)   Instance

                                            (6 Marks)

c)   Discuss the normal strategy for identifying objects say from a textual description of the user specifications and requirements.

                                            (4 Marks)

d)   **Scenario:** The applicant enters the license application number, the system retrieves the information related to it, and the system displays this information.
Using the above scenario, identify the actors and the use cases depicted in the system

                                            (3 Marks)

e)	Play a Dice Game: player requests to roll the dice. System presents the results. It the dice face value totals seven, the player wins, otherwise player loses;

    i)	Identify three classes in the scenario.

                                                               (4 Marks)

    ii)	Draw the class diagram showing the relationships in the model.

                                                               (5 Marks)

    iii)	Draw a use case for the above scenario.

                                                                (4 Marks)

QUESTION TWO (20 MARKS)

a)	Differentiate between the following terms;

    i)	Methodology and process model

    ii)	Object Oriented Analysis and Object Oriented Design

    iii)	Object Oriented Systems Analysis and Design and Structured Systems Analysis and Design Methodologies

                                                                (6 Marks)

b)	Nurses work in a particular ward in care well hospital. Doctors are assigned a number of patients and during their normal rounds, visit a number of different wards, if a doctor needs some advice he/she may consult with a specialist consultant regarding a particular patient. The specialist will then see the patient. Specialists are basically senior doctors.

    Draw a class diagram for the narrative. Include and justify all the relationships and multiplicities in the diagram.

                                                                 (5 Marks)

c)	As part of the college's it strategy, the electronic prospectus is intended to provide means of viewing course information for staff, students and managers. The system should provide lists of lecturers, courses and access to more detailed information about which units are taught on which course, individual lecturer records may be queried for information such as their office room number and email address as well as reporting the units a lecturer teaches. Each course in the prospectus can be identified by unique course named, consists of a number of units at each level. Every course has one lecturer acting as the course leader who is responsible for administering the course and updating includes the prospectus which includes functions such as allowing lecturers and courses to be removed from the system.

    Draw a use case diagram to model the scenario above.

                                                                 (5 Marks)

d)	The library contains books and journals. It may have several copies of a given book. Some of the books are for short term loans only. All other books may be borrowed by any library member for three weeks. Members of the library can normally borrow up to six items at a time, but members of staff may borrow upto 12 items at any one time. Only members of staff may borrow journals.

    Draw an UML collaboration and sequence diagram based on your understanding of the scenario.

                                                                 (4 Marks)

QUESTION THREE (20 MARKS)

a)   Outline the phrases in the unified process in order in which they are ideally carried out

(4 Marks)

b)   Draw a use case diagram for the following scenario;

A golf club wants to develop software to support a number of its activities. The club secretary will use the system to manage membership details, which includes adding and removing members. To become a member an application has to be recommended by two current members. The secretary can add tournaments as well as printing tournament results. Members of the club can enter tournaments if they wish and can view results.

(6 Marks)

c)   The following is a program statement for an elevator system.
Buttons in elevators and on the floors control the movement of 8 elevators in a building with 20 floors. Buttons illuminate when pressed to request in elevators to stop at a specific floor: the illumination is cancelled when the request has been satisfied. When an elevator has no request it remains at its current floor with its doors closed

Draw a class diagram for the above program.

(4 Marks)

d)   Consider the structure of a cellular phone handset. The phone has buttons for entering digits, a "send" button for initiating a call, a microphone a speaker, and a display. It also has a "dialer" that gathers the digits together and emits the appropriate tones and a cellular radio that deals with the connection to the network. The steps involved in making a phone call with such as phone might be summarized as follows;

i)   The user presses the digit buttons to enter a phone number
ii)   The display is updated as each digit is added to the phone number
iii)   The dialer generates a corresponding tone for each digit as it is entered and emits this from the speaker
iv)   The user presses "Send"
v)   The cellular radio establishes a connection to the network
vi)   The phone number is sent to the network
vii)   The connection is made to the phone with specified phone number

Create a collaboration diagram for the above description.

(6 Marks)

QUESTION FOUR (20 MARKS)

a) With the use of an illustration explain the following stereo types as applied mostly in use cases analysis diagram;

   i) <<includes>>

   ii) <<extends>>

   (4 Marks)

b) Consider the following statements involving concepts;

   i) A house on a street

   ii) Components home entertainment system (made up of a juke box, play station, DVD, amplifier, and mixer)

   iii) A room in a house

   Identify the relationships suggested in the statements between the concepts

   (3 Marks)

c) Draw UML notation of the relationships.

   (6 Marks)

d) A customer walks into a baker's shop and asks the baker what kind of loaves she has for sale. The baker looks under the counter and tells the customer that she has two white loaves and one whole meal loaf. The customer says that he would like to buy the whole meal loaf. Now the business transaction takes place: the baker wraps the loaf and offers it up with a request for payment; the customer gives the baker some money; the baker gives the customer some change. The customer leaves, satisfied.
   Draw a collaboration diagram for the above scenario

   (7 Marks)

QUESTION FIVE (20 MARKS)

a) A state transition in a state diagram may be labeled with an event, a guard or an action or with combinations of these three;

   i) What is the difference between an event and a guard?

   (2 Marks)

   ii) What is the difference between an event and an action?

   (2 Marks)

b) To give an exam, an instructor first notifies the students of the exam date and the material to be covered. She then prepares the exam paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it out to students on the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each question, and gets them to mark it. She then records all Marks and returns the papers to the students. Draw a sequence diagram that represents this process.

   (8 Marks)

c) Model the relationship between a car (that has an engine and a color) and its owners (having a name) in a UML class diagram. A car can have several owners over time, but only one or none owner at a time. Remember to include multiplicities, role names, attributes and their types

(4 Marks)

d) Create a collaboration diagram for the following interaction. A customer wants to draw money from his bank account. He enters his card into an ATM (automated teller machine). The ATM machine prompts "Enter PIN". The customer enters his PIN. The ATM (internally) retrieves the bank account number from the card. The ATM encrypts the PIN and the account number and sends it over to the bank. The bank verifies the encrypted Account and PIN number. If the PIN number is correct, the ATM displays "Enter amount", draws money from the bank account and pays out the amount.

(4 Marks)