



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 304-ADVANCED DATABASE SYSTEMS

DATE: 27/9/2019

TIME: 11:00 – 1:00 PM

INSTRUCTIONS:

Answer Question One and Any Other Two Questions.

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Describe the following: [8 marks]
- Data Definition Language
 - Data Manipulation Language
 - Transaction Control Language
 - Data Control Language
- b) Using diagram explain the three components of database management system. [3 marks]
- c) Explain two functions of normalization in database management systems. [2 marks]
- d) Explain the concept of Super Key, Candidate Key and Primary Key with examples? [6 marks]
- e) Explain three concurrency control techniques. [3 marks]
- f) What are the components of data dictionary? Discuss active and passive data dictionaries. [3 marks]
- g) What do you mean by data redundancy? What is the difference between controlled and uncontrolled redundancy? What is data independence? [4 marks]

QUESTION TWO [20 MARKS]

Consider the following database for Airline flight information.

FLIGHT (flno: int, fromplace: string, toplace: string, distance: int, departs: string, arrives: string, price: real)

AIRCRAFT (aid: int, aname: string, crange: int)

EMPLOYEES (eid: int, ename: string, salary: int)

CERTIFIED (eid: int, aid: int)

- a) Create the above tables by properly specifying the primary keys and foreign keys. [3 marks]
- b) Enter at least two tuples for each relation. [4 marks]
- c) Find the names of aircraft such that all certified to operate them have a salaries more than U\$.80, 000. [3 marks]
- d) For each pilot who is certified for more than three aircraft, find the three aircrafts, find the eid and the maximum crusing range of the aircraft for which he or she certified. [2 marks]
- e) Find the names of the pilots whose salary is less than the price of the cheapest route from Bangalore to Frankfurt. [2 marks]
- f) For all aircraft with cruising range over 1000kms. Find the name of the aircraft and the average salary of all pilots certified for this aircraft. [2 marks]
- g) Find the names of the pilots certified for some being aircraft. [2 marks]
- h) Find the aids of all aircrafts that can be used on routes from Mombasa to Nairobi. [2 marks]

QUESTION THREE [20 MARKS]

- a) Describe the differences between Parallel and distributed databases. [4 marks]
- b) Discuss each of the following: [16 marks]
 - i. Object and object relational databases
 - ii. XML databases
 - iii. Mobile databases
 - iv. Intelligent databases

QUESTION FOUR [20 MARKS]

Consider the following database for a BANKING ENTERPRISE.

BRANCH (branch_name: string, branch_city:string, assets:real)

ACCOUNT (accno: int, branch_name:string, balance: real)

CUSTOMER (customer_name: string, customer_street: string, customer_city: string)

DEPOSITOR (customer_name: string, accno: int)

LOAN (loan_number: int, branch_name: string, amount: real)

BORROWER (customer_name: string, loan_number: int)

- a) Create the above tables by properly specifying the primary keys and foreign keys. [4 marks]
- b) Enter at least two tuples for each relation. [4 marks]
- c) Find all the customers who have at least two accounts at the main branch. [4 marks]
- d) Find all the customers who have an account at all the branches located in a specific city. [4 marks]
- e) Demonstrate how you delete all account tuples at every branch located in specific city. [4 marks]

QUESTION FIVE [20 MARKS]

- a) Discuss three classification types of data models. [6 marks]
- b) Describe the Entity Relational Model (E-R Model) and its uses. [4 marks]
- c) Discuss three steps of constructing an ER model, state an example for each step. [6 marks]
- d) Explain Integrity constraints over relations with examples. [4 marks]