



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 (INFORMATION TECHNOLOGY)

SCO 304: ADVANCED DATABASE MANAGEMENT SYSTEMS

DATE:

TIME:

INSTRUCTIONS

Answer question one and any other two questions

QUESTION ONE [30 MARKS]

- a) Explain three goals of distributed database system. [3 marks]
- b) Explain the three concept goals of Parallel Database was built under. [3 marks]
- c) Explain two features of object oriented database systems. [2 marks]
- d) Explain three types of data model in database management model. [3 marks]
- e) Explain three features of normalization in database management system. [3 marks]
- f) Differentiate between Online Transaction Processing and Online Analytical Processing. [2 marks]
- g) Write the syntax and example of the following: [14 marks]
 - i. CREATE
 - ii. ALTER
 - iii. RENAME
 - iv. TRUNCATE
 - v. SELECT
 - vi. INSERT
 - vii. UPDATE

QUESTION TWO [20 MARKS]

The following relations keep track of airline flight information:

Flights (flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time, price: real)

Aircraft (aid: integer, aname: string, cruisingrange: integer)

Certified (eid: integer, aid: integer)

Employees (eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft, and only pilots are certified to fly. Write each of the following queries in SQL.

- a) Find the names of aircraft such that all pilots certified to operate them have salaries more than \$80,000. [1 mark]
- b) For each pilot who is certified for more than three aircraft, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified. [1 mark]
- c) Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu. [1 mark]
- d) For all aircraft with cruisingrange over 1000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft. [1 mark]
- e) Find the names of pilots certified for some Boeing aircraft. [1 mark]
- f) Find the aids of all aircraft that can be used on routes from Los Angeles to Chicago. [1 mark]
- g) Identify the routes that can be piloted by every pilot who makes more than \$100,000. [2 mark]
- h) Print the enames of pilots who can operate planes with cruisingrange greater than 3000 miles but are not certified on any Boeing aircraft. [2 mark]
- i) A customer wants to travel from Madison to New York with no more than two changes of flight. List the choice of departure times from Madison if the customer wants to arrive in New York by 6 p.m. [4 marks]

- j) Compute the difference between the average salary of a pilot and the average salary of all employees (including pilots). [1 mark]
- k) Print the name and salary of every nonpilot whose salary is more than the average salary for pilots. [2 mark]
- l) Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles. [1 mark]
- m) Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles, but on at least two such aircrafts. [1 mark]
- n) Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles and who are certified on some Boeing aircraft. [1 mark]

QUESTION THREE [20 MARKS]

- a) A university registrar's office maintains data about the following entities:
 - i) courses, including number, title, credits, syllabus, and prerequisites;
 - ii) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
 - iii) students, including student-id, name, and program;
 - iv) Instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints. [10 marks]

- b) Using a diagram explain different steps of Knowledge Discovery in Database. [10 marks]

QUESTION FOUR [20 MARKS]

- a) Using a diagram shows a state transition diagram that illustrates how a transaction moves through its execution states and explain each state. [10 marks]
- b) Explain three Problems of Transaction in database management systems and how to solve them. [10 marks]

QUESTION FIVE [20 MARKS]

- a) Using a diagram for illustration, explain the execution sequence steps of database management systems of events when database management systems reads a record. [13 marks]
- b) Describe three types of distributed database management systems. [07 marks]