

MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examination for 2016/2017 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

END OF SEMESTER EXAMS MAY-AUGUST -2016

UNIT CODE:

ADVANCED DATABASE MANAGEMENT SYSTEM

UNIT CODE: SCO 304

DATE:

TIME

INSTRUCTIONS:

Answer questions ONE Compulsory and any other TWO questions.

QUESTION ONE [30 MARKS]

- a) Give the pictorial explanation of a simplified database environment. [6 marks]
- b) What is meant by Database System? [2 marks]
- c) What are the Advantages of using a DBMS? List five advantages [5 marks]
- d) List out the components of DBMS environment. [5 marks]
- e) Give the definition of Data Abstraction. [2 marks]
- f) Database transactions use schedules. What is a schedule? [2 marks]
- g) Write the major steps in database design. [3 marks]
- h) Explain the type of cardinality ratios for binary relationships. [3 marks]
- i) What is stored in a database lock table? [2 marks]

QUESTION TWO [20 MARKS]

- a) Write five points for comparing and contrasting RDBMS and OODBMS. [5 marks]
- b) So why would one choose RDBMS or OODBMS? [5 marks]
- c) The Manager of a video shop called Vision Video (VV) requires you to create a database application system to assist with the administration of the shop. The requirements collection and analysis phase has provided the following data requirements for the database.

The data stored on the videos for hire include the video number, catalogue number, title, and category, and certification, year of release, main actor/actress, purchase price and daily hire rate. The video shop stocks films, that fall into the following categories: comedy, drama, horror, musical, science fiction, children and adults only. The total number of videos in stock should also be available. The data stored on each member of the video shop includes membership number, date joined, name (first and last name), and address, date of birth and telephone number. The total number of members should also be available. Each member may borrow an unlimited number of videos, with the date out and date of return of each video noted. The video number is created by the manager and uniquely identifies each video available for hire. Data on suppliers of videos should also be stored, such as supplier number, name, address, fax number and telephone number. Data on the supply of the current stock of videos should be specifically noted. The video catalogue number uniquely identifies each video and is used by suppliers in the provision of videos. Additional data to be stored includes the quantity of each video supplied and the date supplied.

Create an Entity-Relationship diagram (ERD) for the above system, clearly labeling the entities and relationships and showing the degrees of the relations. [10 marks]

QUESTION THREE [20 MARKS]

- a) How would you (graphically) identify each of following E-R model components?
- An entity
 - An attribute
 - A relationship [6 marks]
- b) What are the **two** advantages of Database Normalization (Any of four)? [2 marks]
- c) State the normal form of the relation shown below and apply normalization rules up to at least 3NF. [6 marks]

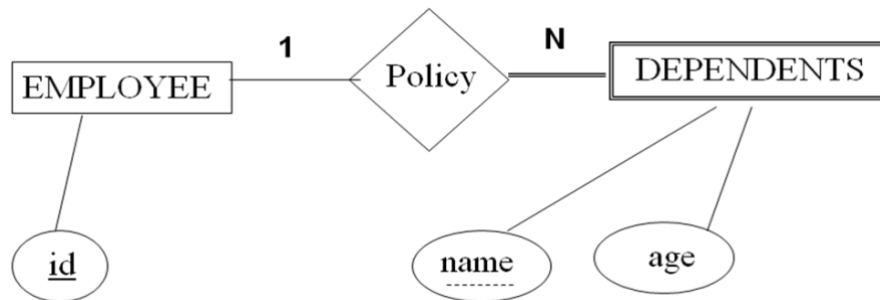
Film (FilmID, FilmName, DirectorID, DirectorName, ActorID, ActorName, Role, ScreenPlayTime)

<u>FilmID</u>	FilmName	DirectorID	DirectorName	ActorID	ActorName	Role	ScreenPlayTime
F1	Ko	D1	K.V.Anand	A2	Jeeva	Hero	180min
				A5	Karthika	Heroine	120min
				A7	Pirakashraj	Villain	60min
F2	Muhamoodi	D3	Myshkin	A2	Jeeva	Hero	160min
				A6	Pooja	Heroine	100min

- d) Name and discuss the different levels of data abstraction as defined by ANSI/SPARC. [6 marks]

QUESTION FOUR [20 MARKS]

- a) What is super key of a relation? [2 marks]
b) What type of constraints can be specified in a relational database? [2 marks]
c) Explain what a referential integrity constraint is. [3 marks]
d) What is meant by “schema mapping”? [3 marks]
e) Write the schema from ER Model given below.



- e) What are the main building modules of the Entity Relationship model? Discuss each one. [6 marks]
f) What is a composite entity, and when is it used? [2 marks]
g) Why is data modeling considered a "communication tool?" [2marks]

QUESTION FIVE [20 MARKS]

Consider the following relational schema. An employee can work in more than one department. The pct-time field of the Works relation shows the percentage of time that a given employee works in a given department. The primary keys are underlined.

Employee (eid: integer, name: string, age: integer, salary: real)

Works (eid: integer, did: string, pct-time: integer)

Department (did: string, budget: real, managerid: integer)

- a) Write the following queries in SQL [10 marks]
- Print the name and ages of each employee who works in both hardware and software departments.
 - Print the name of employees who do not manage any department yet.
 - Find the managerids of managers who manage only departments with budgets greater than 1,000,000
 - Find the names of managers who manage the departments with the largest budget
 - Find the managerid of managers who control the largest amount
- b) Which protocol is commonly used to ensure conflict serializable schedules? [2 marks]
- c) What are the two different approaches for log-based recovery? [2 marks]
- d) Consider the following three transactions T1-T3 which are to be executed concurrently.

T1	T2	T3
READ(A) A:=A+20 WRITE(A)	READ(C) READ(B) B:=B+10 WRITE(B)	READ(B) READ(C)
READ(B) B:=B-A WRITE(B)	READ(A) A:=A-10	B:=B+C WRITE(B) C:=B-C WRITE(C)
	WRITE(A)	

Draw the precedence graph of the above schedule. [2 marks]

- e) Using the precedence graph produced in (i) above, discuss whether the given schedule is conflict serializable? [2 marks]
- f) Hence, discuss whether the given schedule is view serializable? [2 marks]