

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SCIENCE AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE
BACHELOR OF SCIENCE HONORS DEGREE IN COMPUTER SCIENCE / INFORMATION
TECHNOLOGY
CS201: DATABASE CONCEPTS

DURATION: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS TO CANDIDATES

Answer ALL questions.

The paper consist of **SECTION A** (theory) and **SECTION B** (practical)

 JUN 2023

Question 1

- a. Explain the five components of DBMS environment. [5]
- b. Explain any three duties of Database Administrator. [6]
- c. Differentiate logical database design and physical database design. Show how this separation leads to data independence. [6]
- d. Define any two basic operators of relational algebra with an example. [6]
- e. Describe entity integrity and referential integrity. [4]

Question 2

The E/R diagram in figure 2.1 below is part of an E/R diagram for a database used by a store to keep track of its sales. Translate this ER diagram into a set of relations. Mark keys and references clearly in your answer. [9]

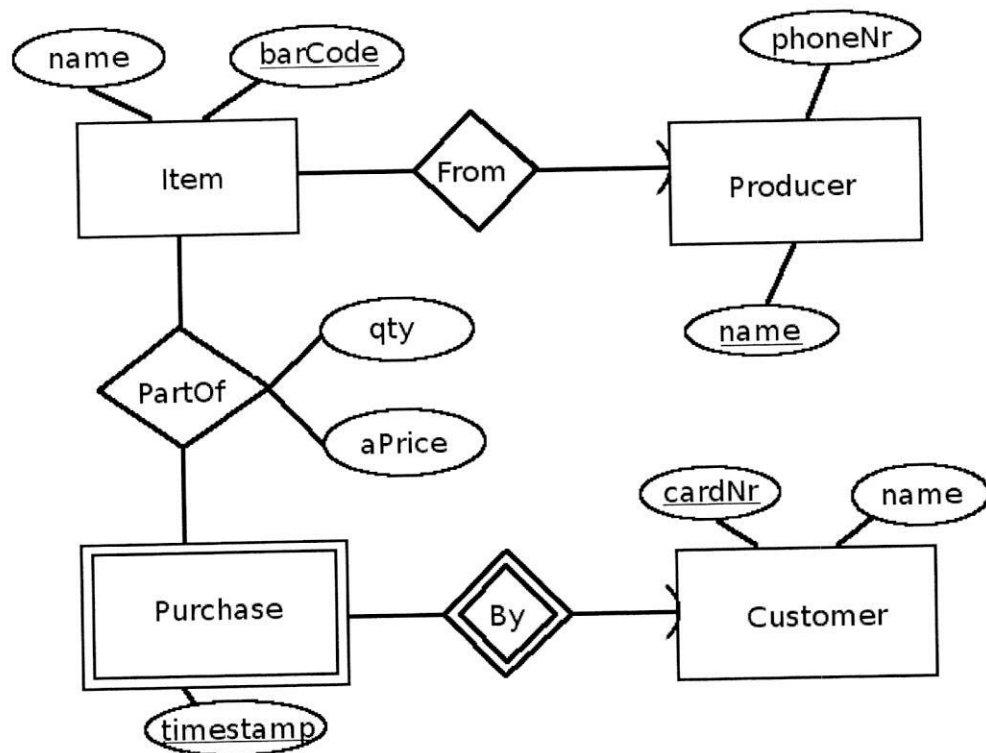


FIGURE: 2.1 ER diagram

Question 3

- a. An important concept in the theory of relational databases is that of a functional dependency.
- Explain what is meant by a functional dependency and give an example. [2]
 - Identify two functional dependencies in the following table (A, B and C are the attributes): [2]

Table 3.1 Functional Dependency

A	B	C
a1	b1	c1
a1	b1	c3
a1	b2	c1

b. Examine table 3.2 shown below.

Table 3.2 Branch staff

<i>branchNo</i>	<i>branchAddress</i>	<i>telNo</i>	<i>mgrStaffNo</i>	<i>name</i>
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618	S1500	Tom Daniels
B002	City Center Plaza, Seattle, WA 98122	206-555-6756	S0010	Mary Martinez
B003	14 – 8th Avenue, New York, NY 10012	212-371-3000	S0145	Art Peters
B004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131	S2250	Sally Stern

- i. Why is this table not in 3NF? [4]
- ii. Describe and illustrate the process of normalizing the data shown in this table to third normal form (3NF). [4]
- iii. Identify the primary, (alternate) and foreign keys in your 3NF relations. [2]

SECTION B (PRACTICAL)

CREATE A FOLDER ON THE DESKTOP AND NAME IT USING YOUR REGISTRATION NUMBER. SAVE ALL YOUR WORK IN THIS FOLDER

Question 4

A snapshot of the tables constituting the database for Celerity logistics is shown on the next page.

- a. Use Structured Query Language (SQL) and create the database shown below and save it as puscot_db, make sure you enforce all the required constraints. [30]
- b. Using Structured Query Language (SQL) creates the following reports and save the reports in the database.
 - i. Promote David Ford (staffNo="SG14") to Manager and change his salary to \$18,000. [3]
 - ii. Give all staff a 3% pay increase. [2]
 - iii. List all cities where there is either a branch office or a property [2]
 - iv. Find number of properties handled by each staff member. [3]
 - v. List names of all clients who have viewed a property along with any comment supplied. [5]
 - vi. Find number of properties handled by each staff member. [5]

Branch

branchNo	street	city	postcode
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B003	163 Main St	Glasgow	G11 9QX
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

Staff

staffNo	fName	lName	position	sex	DOB	salary	branchNo
SL21	John	White	Manager	M	1-Oct-45	30000	B005
SG37	Ann	Beech	Assistant	F	10-Nov-60	12000	B003
SG14	David	Ford	Supervisor	M	24-Mar-58	18000	B003
SA9	Mary	Howe	Assistant	F	19-Feb-70	9000	B007
SG5	Susan	Brand	Manager	F	3-Jun-40	24000	B003
SL41	Julie	Lee	Assistant	F	13-Jun-65	9000	B005

PropertyForRent

propertyNo	street	city	postcode	type	rooms	rent	ownerNo	staffNo	branchNo
PA14	16 Holhead	Aberdeen	AB7 5SU	House	6	650	CO46	SA9	B007
PL94	6 Argyll St	London	NW2	Flat	4	400	CO87	SL41	B005
PG4	6 Lawrence St	Glasgow	G11 9QX	Flat	3	350	CO40		B003
PG36	2 Manor Rd	Glasgow	G32 4QX	Flat	3	375	CO93	SG37	B003
PG21	18 Dale Rd	Glasgow	G12	House	5	600	CO87	SG37	B003
PG16	5 Novar Dr	Glasgow	G12 9AX	Flat	4	450	CO93	SG14	B003

Client

clientNo	fName	lName	telNo	preType	maxRent
CR76	John	Kay	0207-774-5632	Flat	425
CO56	Aline	Stewart	0141-848-1825	Flat	350
CR74	Mike	Ritchie	01475-392178	House	750
CR62	Mary	Tregear	01224-196720	Flat	600

PrivateOwner

ownerNo	fName	lName	address	telNo
CO46	Joe	Keogh	2 Fergus Dr. Aberdeen AB2 7SX	01224-861212
CO87	Carol	Farrel	6 Achray St. Glasgow G32 9DX	0141-357-7419
CO40	Tina	Murphy	63 Well St. Glasgow G42	0141-943-1728
CO93	Tony	Shaw	12 Park Pl. Glasgow G4 0QR	0141-225-7025

Viewing

clientNo	propertyNo	viewDate	comm
CR56	PA14	24-May-04	too small
CR76	PG4	20-Apr-04	too remote
CR56	PG4	26-May-04	
CR62	PA14	14-May-04	no dining room
CR56	PG36	28-Apr-04	

Registration

clientNo	branchNo	staffNo	dateJoined
CR76	B005	SL41	2-Jan-01
CR56	B003	SG37	11-Apr-00
CR74	B003	SG37	16-Nov-99
CR62	B007	SA9	7-Mar-00

*****END OF PAPER*****