Database Concepts

Standard difficulty · 20 questions · 40 marks · Time: 39 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A DBMS is:

(a) a kind of printer

(b) an input device

(c) a single text file

(d) software to create, store, manage and query databases

2. What is the degree of this relation?
Relation: STUDENT

AdmNo	RollNo	Name	Section	City
1012	27	Ritu	B	Patna
1101	28	Pooja	A	Kochi
1461	29	Manav	A	Pune
1702	30	Zoya	A	Patna
1835	31	Rahul	A	Kochi
1913	32	Zoya	B	Kochi

(a) 4 **(b)** 5 **(c)** 6 **(d)** 7

3. What is the cardinality of this relation?
Relation: STUDENT

AdmNo	RollNo	Name	Section	City
1120	29	Kabir	B	Patna
1436	30	Bhavna	A	Patna
1511	31	Sana	B	Kochi
1519	32	Pooja	B	Patna
1568	33	Uday	B	Patna
1600	34	Jaya	B	Agra
1822	35	Sana	A	Pune
1889	36	Meera	B	Pune

(a) 5 **(b)** 7 **(c)** 9 **(d)** 8

4. Which attribute of this relation could be its primary key?
Relation: STUDENT
AdmNo | RollNo | Name | Section | City
1010 | 1 | Ritu | B | Patna
1034 | 2 | Manav | B | Patna
1154 | 3 | Naina | B | Kochi
1276 | 4 | Deepa | B | Pune
1612 | 5 | Uday | B | Kochi
1672 | 6 | Harsh | B | Patna
1852 | 7 | Harsh | B | Patna
1904 | 1 | Chetan | A | Patna

(a) Name **(b)** RollNo **(c)** AdmNo **(d)** Section

5. An attribute whose values must match the primary key of another relation is called:

(a) foreign key **(b)** domain **(c)** alternate key **(d)** attribute

6. The same address is copied into three different files. Which limitation of a file system is this?

(a) data dependence **(b)** data isolation
(c) controlled data sharing **(d)** data redundancy

7. GUID in STUDENT is a foreign key referring to GUARDIAN. Which student's row breaks referential integrity?
Table: GUARDIAN
GUID | GName
G39 | Bhavna
G11 | Ritu
G16 | Zoya
Table: STUDENT
RollNo | SName | GUID
1 | Ishaan | G39
2 | Deepa | G45
3 | Sana | G48
4 | Asha | G11
5 | Rahul | G16

(a) Rahul **(b)** Sana **(c)** Ishaan **(d)** Asha

8. The candidate keys of a relation PATIENT are AdmNo, RollNo, Email, Phone. Email is chosen as its primary key. How many alternate keys does it have?

(a) 4 **(b)** 5 **(c)** 3 **(d)** 1

Section B — Short answer 8 × 2 = 16 marks

9. Give two limitations of a file system for storing data.

10. Relation: STUDENT
AdmNo | RollNo | Name | Section | City
1125 | 30 | Aarav | A | Pune
1478 | 31 | Chetan | A | Pune
1510 | 32 | Lakshmi | B | Pune
1586 | 33 | Bhavna | B | Patna
1634 | 34 | Asha | B | Kochi
1825 | 35 | Kavya | B | Patna
1972 | 36 | Lakshmi | B | Pune
Find (a) its degree (b) its cardinality (c) its cardinality after 1 tuple is added and 5 deleted.

11. Which single attributes of this relation are candidate keys? Write them separated by commas.
Relation: STUDENT
AdmNo | RollNo | Name | Section | City
1191 | 1 | Asha | A | Agra
1280 | 1 | Gauri | B | Patna
1400 | 2 | Sahil | A | Kochi
1425 | 3 | Farhan | A | Pune
1436 | 4 | Zoya | A | Kochi
1546 | 5 | Asha | A | Pune
1865 | 6 | Uday | A | Kochi

12. The candidate keys of a relation are RollNo, BadgeNo, LibraryCardNo, MemberId. If BadgeNo is chosen as the primary key, what are the alternate keys? Write them separated by commas.

13. GUID in STUDENT refers to GUARDIAN. Which students have a GUID that does not exist in GUARDIAN? Write their names separated by commas.

Table: GUARDIAN

GUID | GName

G44 | Zoya

G41 | Ishaan

G39 | Chetan

G18 | Gauri

Table: STUDENT

RollNo | SName | GUID

1 | Aarav | G44

2 | Bhavna | G55

3 | Pooja | G39

4 | Uday | G41

5 | Manav | G59

14. Table: ATTENDANCE

AttDate | RollNo | Status

2026-07-07 | 35 | P

2026-07-07 | 36 | P

2026-07-07 | 37 | P

2026-07-08 | 35 | P

2026-07-08 | 36 | P

2026-07-08 | 37 | P

(a) How many tuples are there for RollNo 37? (b) What is the cardinality of the relation?

15. A school keeps a guardian's phone number in 4 separate files for each of its 190 students. Every student has a different guardian. How many phone numbers are stored in all, and how many would a database need if it kept them once, in a GUARDIAN table?

16. Relation: STUDENT

AdmNo | RollNo | Name | Section | City

1015 | 30 | Zoya | A | Patna

1065 | 31 | Zoya | A | Kochi

1166 | 32 | Ishaan | B | Patna

1263 | 33 | Chetan | B | Agra

1268 | 34 | Manav | A | Agra

1323 | 35 | Farhan | B | Agra

How many different values does the attribute Section take in this relation?

Section C — Word problems — 4 × 4 = 16 marks

17. Explain five limitations of a file system and how a DBMS overcomes each.

18. Relation: STUDENT
AdmNo | RollNo | Name | Section | City
1123 | 22 | Jaya | A | Kochi
1384 | 23 | Chetan | B | Patna
1514 | 24 | Sana | B | Kochi
1703 | 25 | Sana | A | Kochi
1882 | 26 | Pooja | B | Agra
1900 | 27 | Rahul | B | Patna
(a) What are its degree and cardinality? (b) Which attributes are candidate keys? (c) If AdmNo is the primary key, which are alternate keys? (d) Why can Name not be a key?

19. Table: GUARDIAN
GUID | GName
G29 | Jaya
G55 | Varun
G32 | Manav
Table: STUDENT
RollNo | SName | GUID
1 | Sahil | G29
2 | Aarav | G29
3 | Ritu | G32
4 | Kavya | G29
5 | Gauri | G29
6 | Tanvi | G18
(a) Which attribute is the primary key of GUARDIAN? (b) Which attribute of STUDENT is a foreign key? (c) Which students break referential integrity? (d) What should a DBMS do when such a row is inserted?

20. Table: ATTENDANCE
AttDate | RollNo | Status
2026-07-12 | 9 | P
2026-07-12 | 34 | P
2026-07-13 | 9 | P
2026-07-13 | 34 | P
2026-07-14 | 9 | P
2026-07-14 | 34 | P
Answer Yes or No: (a) Is AttDate alone unique? (b) Is RollNo alone unique? (c) Is the pair (AttDate, RollNo) unique?

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Answer key

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Q	Answer	Working
1	**(d) software to create, store, manage and query databases**	—
2	**(b) 5**	degree = number of attributes (columns)
3	**(d) 8**	cardinality = number of tuples (rows)
4	**(c) AdmNo**	AdmNo has a different value in every row and no NULL
5	**(a) foreign key**	—
6	**(d) data redundancy**	—
7	**(b) Sana**	Sana's GUID is not in GUARDIAN
8	**(c) 3**	alternate keys: AdmNo, RollNo, Phone
9	**Data redundancy (the same data in many files) and data inconsistency (copies that disagree); also data isolation and dependence on file formats.**	—
10	**(a) 5; (b) 7; (c) 3**	degree = columns; cardinality = rows; 7 + 1 − 5
11	**AdmNo**	a candidate key has a different, non-NULL value in every row
12	**RollNo, LibraryCardNo, MemberId**	every candidate key except the primary key
13	**Bhavna, Manav**	look up each GUID in GUARDIAN
14	**(a) 2; (b) 6**	3 students × 2 dates
15	**760; 190**	4 × 190; one per student's guardian
16	**2**	A, B
17	**Redundancy and inconsistency (a DBMS stores data once and links tables), data isolation (tables can be joined by keys), data dependence (programs use queries, not file layouts), uncontrolled sharing (a DBMS gives each user only the rights they need).**	—
18	**(a) degree 5, cardinality 6; (b) AdmNo, RollNo; (c) RollNo; (d) two students share a name, so Name does not identify a row**	unique and non-NULL in every row
19	**(a) GUID; (b) GUID; (c) Tanvi; (d) reject the insertion, because the GUID must already exist in GUARDIAN**	a foreign key value must match a primary key value in the referenced table (or be NULL)
20	**(a) No; (b) No; (c) Yes**	each date repeats for every student and each roll number for every date; the pair appears once