

**Paper I**

Qn	Answer
1	4
2	1
3	1
4	5
5	2
6	4
7	4
8	5
9	2
10	2
11	5
12	5
13	3
14	4
15	2
16	1
17	All
18	1
19	3
20	3
21	5
22	5
23	4
24	3
25	3

Qn	Answer
26	3
27	4
28	4
29	3
30	1
31	3
32	4
33	3
34	3
35	1
36	5
37	5
38	S,E: 4   T:1
39	4
40	4
41	3
42	5
43	All
44	5
45	5
46	4
47	3
48	1
49	1
50	4

**Paper II (Part A)**

1 (a) (i) Social networking has advantages and disadvantages [1]

(ii) Ignore border style. [2]

Schedule

Time	Event
8 am	Drama
10 am	News
Lunch	

Marks allocated as follows:

A: **1 mark** for centered caption, two bold headings and three rows with correct data

B: **1 mark** for the merged last row with *Lunch* left aligned

(b) (i) **Two** points from [2]

- It is easy to keep one standard throughout the page.
- Less code lines to manage (modification in one place can be applied to the whole web site or multiple web pages) / Easy maintenance
- Reduced code complexity / Easy to understand
- Efficiency as it reduces the code lines / Page will load quicker when the main CSS file has been cached

(ii) Exact syntax and spellings essential. [2]  
Ignore *spacing* defects and case.

p, h1, h2 {color: red; font-family:Calibri;}

p, h2 {text-align:justify;}

Marks allocated as follows:

A: **1 mark** for row 1

B: **1 mark** for row 2

(c) **One mark** for **each** correct row. [3]  
Ignore case of INSERT.

Double or single quotations can be used.

Row 1: 'admin' , 'A!2t\*' , 'school\_db'

Row 2: INSERT, student, name, class

Row 3: \$sql

2 (a) One mark per each correct row. [6]

No mark for a row if more than one item in that row.

Ignore spelling defects and case.

Phrase no.	Item
(i)	traditional marketplace
(ii)	harmful explosives
(iii)	subscription as a revenue model
(iv)	social commerce
(v)	payment gateway
(vi)	Government to Citizen (G2C) service / G2C service / G2C

(b) (i) 8 [2]

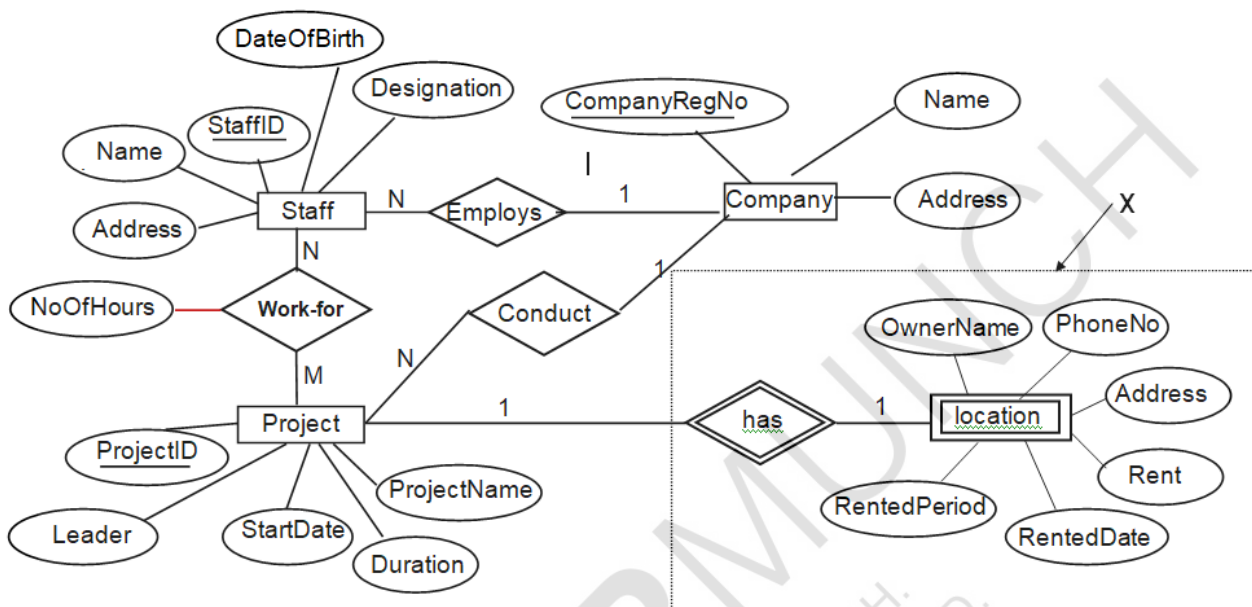
(ii) Any purpose from [2]

- Finding the maximum / largest / highest / greatest in a list of positive numbers
- Find the maximum / largest / highest / greatest from a given input

3 (a) (i) NoOfHours [1]

(Correct symbol, exact spelling, case and proper positioning is **essential**. Ignore spacing defects.)

(ii) [4]



Marks allocated as follows:

- A: 1 mark for Location with correct symbol and label
- B: 1 mark for has relationship with correct symbol and linked to Project entity with proper cardinality
- C: 1 mark for all six Location attributes with correct symbols
- D: 1 mark for completeness (full marks for A,B,C, exact spellings and case with no spaces)

Note: If Company entity is linked to Location entity, do not deduct marks.

(b) One mark per each correct row. [5]

No mark if more than one term in any row.

Ignore spelling defects.

- (i) Domain Name System / DNS
- (ii) Application Layer
- (iii) DHCP
- (iv) CIDR
- (v) Parity Bit

- 4 (a) (i) Address of the next instruction to be executed [1]
- (ii) Ready [1]
- (No mark if more than one state given.)
- (b) (i) Space for a file is allocated as a collection of consecutive / adjacent / contiguous / continuous blocks [1]
- (ii) Any one point from [1]
- Extending the file size is difficult
  - May result in fragmentation / external fragmentation / Defragmentation can take up a lot of time and may need the system to be down
  - The expected final file size must be known at the time of creation
  - Finding space for a new file is difficult
- (iii) Any one point from [2]
- Final sizes of the files to be stored are known
  - On a CDROM, there is no deletion of files thus there is no danger of fragmentation
  - There is no need to extend file sizes
- (iv) Any one point from [1]
- Address of the next block of the file / next block number
  - End-of-File marker
  - Pointer to the next block
- (c) (i) Any one from [1]
- $8200_{10}$
  - $010000000001000_2$  /  $10000000001000_2$
- (Students need not write the bases.)
- (ii) The program size could be larger than the size of the physical memory [1]
- (iii) Any one point from [1]
- That page would not have been accessed before
  - That page would have got evicted / removed / expelled from physical memory

**Paper II (Part B)**

1 (a)

[4]

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Marks allocated as follows:

**Four marks** for all **8 rows** correct

**Three marks** for **maximum 6,7 rows** correct

**Two marks** for **maximum 4,5 rows** correct

**One mark** for **maximum 3 rows** correct

(b)

[6]

		AB			
		00	01	11	10
C	0	0	0	1	0
	1	0	1	1	1

$Z = AB + BC + AC$

Marks allocated as follows:

A: **1 mark** for correct map entries

B: **3 marks** for the **three** correct loops (1 mark X 3)

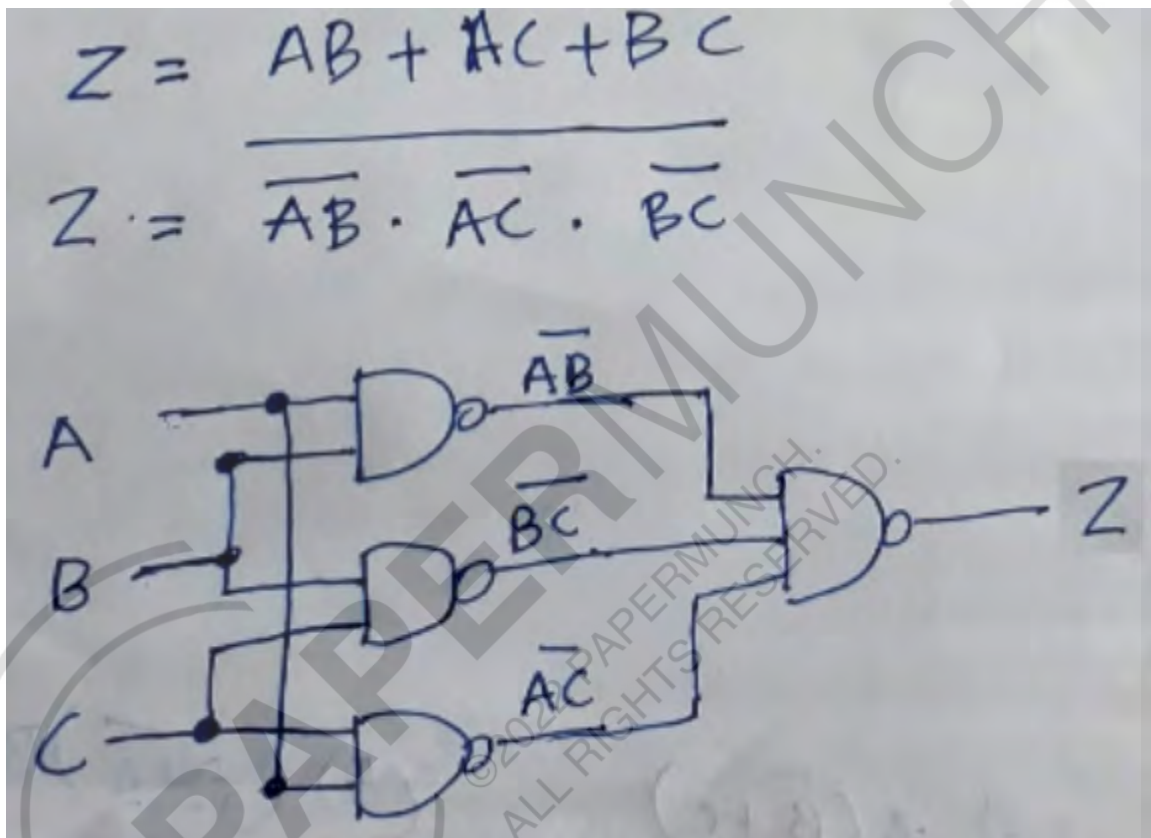
C: **2 marks** for the final simplified expression

(c)

[5]

**Zero marks** if any other gate is used or if **all the inputs** are not labelled. Deduct **1 mark** if the output is not labelled.

Equation not essential.



Marks allocated as follows:

**5 marks** if the diagram is as above (ignore intermediate terms)

Alternative:

For a logically correct but an unoptimized NAND gate arrangement (using many gates) give a total of **2 marks**

2 (a) 2 marks per correct row

[6]

Building order may be different.

Building	Network address	Subnet mask	IP Address range
Admin	192.248.16.0	255.255.255.192	192.248.16.1 - 192.248.16.62 or 192.248.16.0 - 192.248.16.63
Lab	192.248.16.64	255.255.255.192	192.248.16.65 - 192.248.16.126 or 192.248.16.64 - 192.248.16.127
Lib	192.248.16.128	255.255.255.192	192.248.16.129 - 192.248.16.190 or 192.248.16.128 - 192.248.16.191

Alternative answer for **any row**:

Network address	Subnet mask	IP Address range
192.248.16.192	255.255.255.192	192.248.16.193 - 192.248.16.254 or 192.248.16.192 - 192.248.16.255

Alternative answer 1:

Building	Network address	Subnet mask	IP Address range
Admin	192.248.16.0	255.255.255.128	192.248.16.1 - 192.248.16.126 or 192.248.16.0 - 192.248.16.127
Lab	192.248.16.128	255.255.255.192	192.248.16.129 - 192.248.16.190 or 192.248.16.128 - 192.248.16.191
Lib	192.248.16.192	255.255.255.192	192.248.16.193 - 192.248.16.254 or 192.248.16.192 - 192.248.16.255



Alternative answer 2:

Building	Network address	Subnet mask	IP Address range
Admin	192.248.16.0	255.255.255.192	192.248.16.1 - 192.248.16.62 or 192.248.16.0 - 192.248.16.63
Lab	192.248.16.64	255.255.255.192	192.248.16.65 - 192.248.16.126 or 192.248.16.64 - 192.248.16.127
Lib	192.248.16.128	255.255.255.128	192.248.16.129 - 192.248.16.254 or 192.248.16.128 - 192.248.16.255

(From the two ranges given for each *IP Address Range*, only the first one gives the range of *usable* IP addresses.)

**Note:**

If only **two columns** correct in a row, give **one mark** for that row.

(E.g., if only 2 columns are correct in each of the three rows, then give a total of **three marks** [1 mark X 3] for this part.)

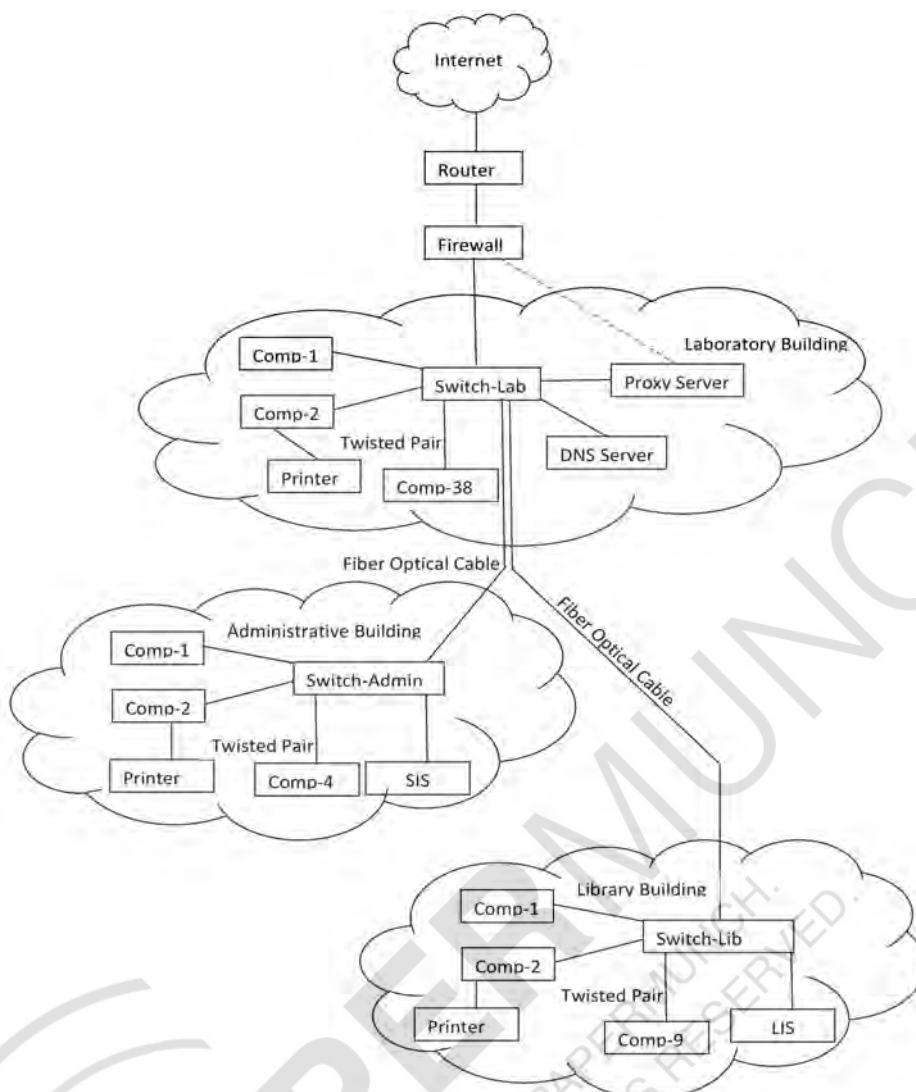
**(b)** Any one point from

**[1]**

- Costly / difficult to install / impractical due to buildings being geographically separated
- Difficult to configure
- There is no such connectivity requirement for the school

(c)

[7]



Marks allocated as follows:

- A: **1 mark** for Internet – Router – Firewall link
  - B: **1 mark** for getting the Internet connection to the Lab switch
  - C: **1 mark** for interconnecting the Admin and Lib switches to the Lab switch
  - D: **1 mark** for properly locating Proxy and the DNS servers
  - E: **1 mark** for properly connecting SIS to Admin switch **and** LIS to Lib switch
  - F: **1 mark** for properly identifying the number of nodes in each building
  - G: **1 mark** for properly connecting the printer<sup>†</sup> **and** for not using unnecessary devices
- † As the printer type is not indicated, connecting each printer directly to the relevant switch is also acceptable

(d)

- Any one point from** **[1]**
- The applications that the school will be using will benefit from the many desirable features of TCP such as reliability, in-order delivery, connection oriented nature, flow-control, congestion control, error recovery and re-transmission of packets when necessary
  - The transmission time required for the school applications is not very critical
  - TCP is used for the *web* and *email* applications

- 3 (a) (i) Online sales [1]
- (ii) Any one from [1]
- Customers being reluctant to buy second hand books online as they do not have the ability to inspect their quality
  - Having to compete against online sellers of new books / e-books
- (iii) 1 mark for each [3]
- A: B2C – Between ABC Books and its customers / Between a business and its customers
- B: B2B – Between ABC Books and other businesses / Between two other businesses
- C: C2C – Between individual customers of the marketplace
- (iv) Any one from [1]
- Advertising support / revenue
  - Subscription fees
  - Transaction fees / commissions
- (v) Any one from [1]
- through credit/debit cards / payment gateways / electronic payment cards
  - through e-banking / Internet banking
  - transactions using mobile phones
  - through third party payment facility providers
- (vi) Any one from [1]
- Analyzing high demand books
  - Analyzing the purchase trends
  - Analyzing customer preferences

(b) (i) Agent 2 [1]

(ignore spelling defects and case)

(ii) [2]

Sense – A  
Compute – C  
Control - B

*Marks allocated as follows:*

**Two marks** for all **three** correct  
**One mark** for **one or two** correct

(iii) **1 mark** for each [2]

C – Database read and write operations  
R – Camera input feed and Camera control commands

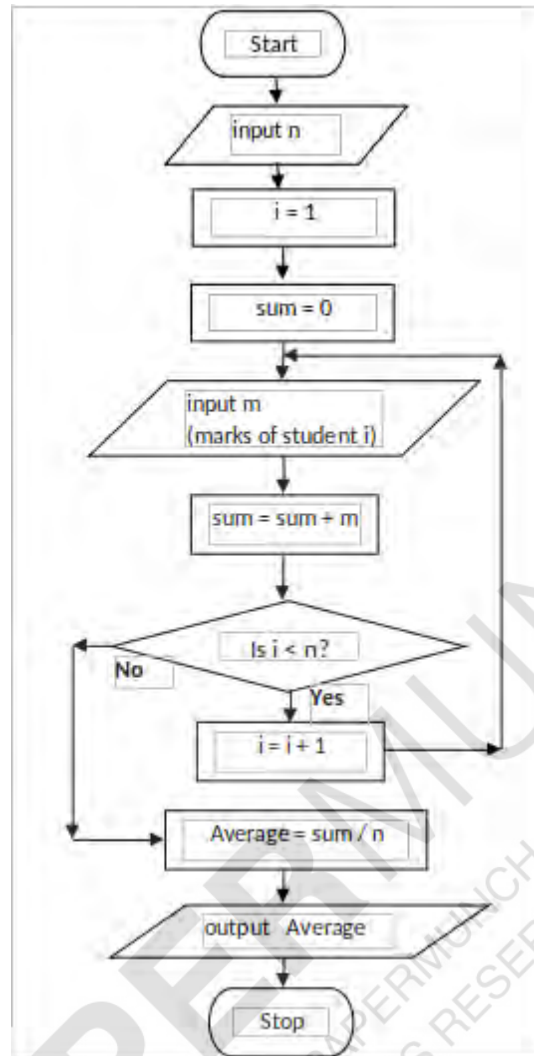
(iv) P: informing Agent 2 to operate [1]

(v) [1]

CCTV raw data input need to be processed before storage in the DB.  
Processing allows data reduction, annotations and other value added functions.

4 (a)

[8]



Marks allocated as follows:

- A - 1 mark for the *input of n*
- B - 1 mark for both initializations
- C - 1 mark for the *loop check*
- D - 1 mark for the *input of a mark* (if properly inside loop)
- E - 1 mark for the *summation computation* and *computing next loop index* (if properly inside loop)
- F - 1 mark for the *correct average computation*
- G - 1 mark for *printing the correct average*
- H - 1 mark for correct symbols and arrows

(b) (i) 3 [1]

(ii) Any one from [1]

- Count the number of even numbers in a list
- Print the number of even numbers in a list

(iii) [5]

```
n= int(input())
a = 0
while (n > 0):
    x = int(input())
    if (x % 2 == 0):
        a = a + 1
    n = n - 1
print (a)
```

An alternative code:

```
n = int(input())
a = 0
while True:
    if n <= 0:
        break
    x = int(input())
    if x%2 == 0:
        a = a + 1
    n = n - 1
print (a)
```

**Note:** Any other correct Python program that correctly implements the algorithm is also acceptable (E.g., Through the use of a *for* loop)

Marks allocated as follows:

A: **1 mark** for correctly placed `n= int(input())`

B: **1 mark** for correctly placed `while (n > 0):`

`n = n - 1`

C: **1 mark** for the following if correctly placed inside loop

`x= int(input())`

D: **1 mark** for the correctly placed `a = 0`

and for the following if correctly placed inside loop

```
if (x % 2 == 0):
    a = a + 1
```

and for the correctly placed

`print (a)`

E: **1 mark** for correct *indentation*

5 (a)

[2]

Relation I:

Normal form	Justification
2	As all non-key attributes are fully functionally dependent on the primary key / There are transitive dependencies

Relation II and Relation III: **Any one** or **both** from

•

Normal form	Justification
2	As all non-key attributes are fully functionally dependent on the primary key / There are transitive dependencies

•

Normal form	Justification
3	No transitive dependencies

Marks allocated as follows:

**Two marks** for all **three** relations correct  
**One mark** for **one or two** relations correct

(b)

[5]

Relation I: P: 3 / 3 NF  
 S: Customer (Customer\_NIC, Customer\_Name, City)  
 Customer\_City (City, Postal\_Code)

Relation II: **Any one** from

- Q: 3 / 3 NF  
 T: Vehicle\_Owner (Owner\_Id, Owner\_Name, Contact\_No)
- Q: It cannot be normalized further from 3 NF  
 T: - / Vehicle\_Owner (Owner\_Id, Owner\_Name, Contact\_No)

Relation III: **Any one** from

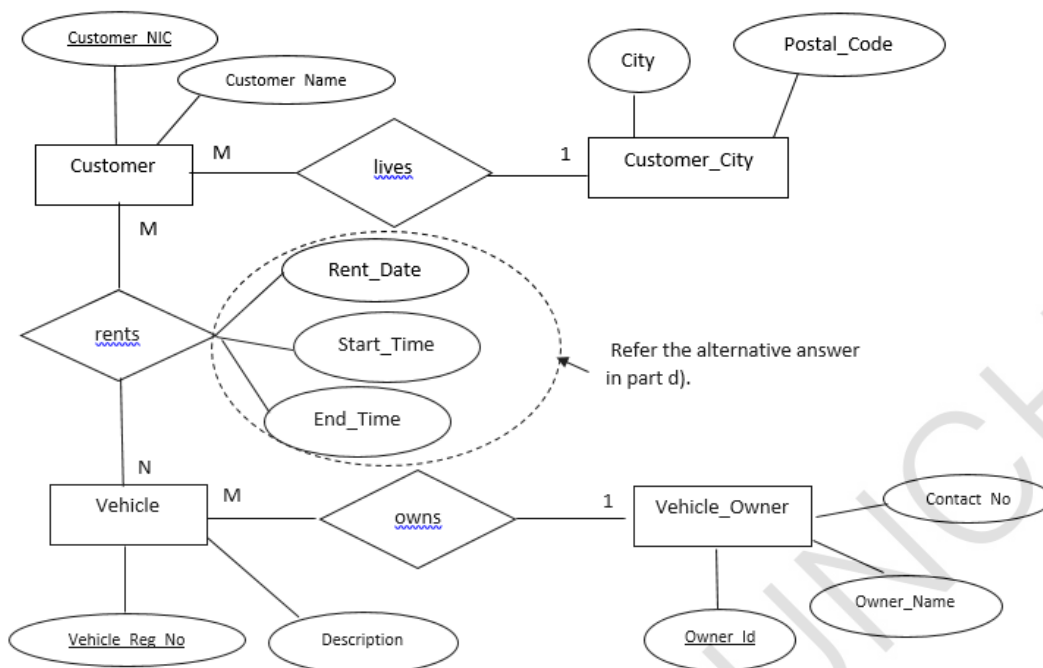
- R: 3 / 3 NF  
 U: Vehicle(Vehicle\_Reg\_No, Description, Owner\_Id)
- R: It cannot be normalized further from 3 NF  
 U: - / Vehicle(Vehicle\_Reg\_No, Description, Owner\_Id)

Marks allocated as follows:

P - **1 mark**  
 S - **2 marks** (one mark per relation with primary keys marked)  
 Q and T - **1 mark**  
 R and U - **1 mark**

(c)

[5]



Marks allocated as follows:

A: **1 mark** per relationship (*rents*, *owns*) with correct cardinality (Total **2 marks**)

B: **1 mark** for Customer, Vehicle and Vehicle\_Owner entities with all attributes

C: **1 mark** for correctly denoting all three keys

D: **1 mark** for completeness (spellings, case, spacing)

(d)

[1]

Rent(Customer\_NIC, Vehicle\_Reg\_No, Rent\_Date, Start\_Time, End\_Time)

Alternative answers:

1. This relationship may also be incorporated to the ER diagram in (c) **with** the keys correctly marked.

2. CREATE TABLE Rent  
(Customer\_NIC varchar(10),  
Vehicle\_Reg\_No varchar (8), Rent\_Date date, Start\_Time time, End\_Time time,  
PRIMARY KEY (Customer\_NIC, Vehicle\_Reg\_No);

Note: The primary key can also be introduced as a constraint.

(e)

Any one answer from

[2]

- SELECT Owner\_Id, Vehicle\_Reg\_No FROM Vehicle GROUP BY Owner\_Id;
- SELECT Owner\_Id, Vehicle\_Reg\_No FROM Vehicle;

Marks allocated as follows:

A: **1 mark** for correct query (ignore case of SELECT)

B: **1 mark** for completeness (correct syntax, correct names, semicolon use)



- 6 (a) (i) One mark per each. [5]
- P - Test request slip / Request slip  
 Q - Invoice  
 R - Receipt  
 S - Updated receipt  
 T - Report
- (ii) One mark per each. [2]
- (A) W - Payments  
 (B) X - Approved invoice + payment
- (b) (i) Any one point from [1]
- Analysing / finding the requirements of an information system before its development
  - Finding the functional and non-functional requirements of a system
  - Analysing the requirements of a proposed system
  - Studying and analyzing the user needs to define the problem domain and system requirements
  - Determining user expectations for a new or modified product
- (ii) Any two advantages from [2]
- Allows to discover the system scope/boundary and the nature of system interaction within its environment
  - Allows to detect and resolve conflicts between the requirements
  - Allows to prioritize requirements relatively to each other
  - Helps in deciding the critical success factors
  - Reduces project / implementation risks
  - Helps in distinguishing *functional* and *non-functional* requirements
- (iii) Any one point from [1]
- Through testing based on functional requirements (**Except** system/integration testing)
  - Through validation / verification
- (iv) One mark per each correct requirement (Max. two marks per set). [4]
- Functional requirements: A, B  
 Non-functional requirements: **Any two** from D, F, G
- (Deduct 1 mark for any incorrect **extra** label. Note: Minimum 0 marks )