

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)

[1]

Social networking has advantages and disadvantages

(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

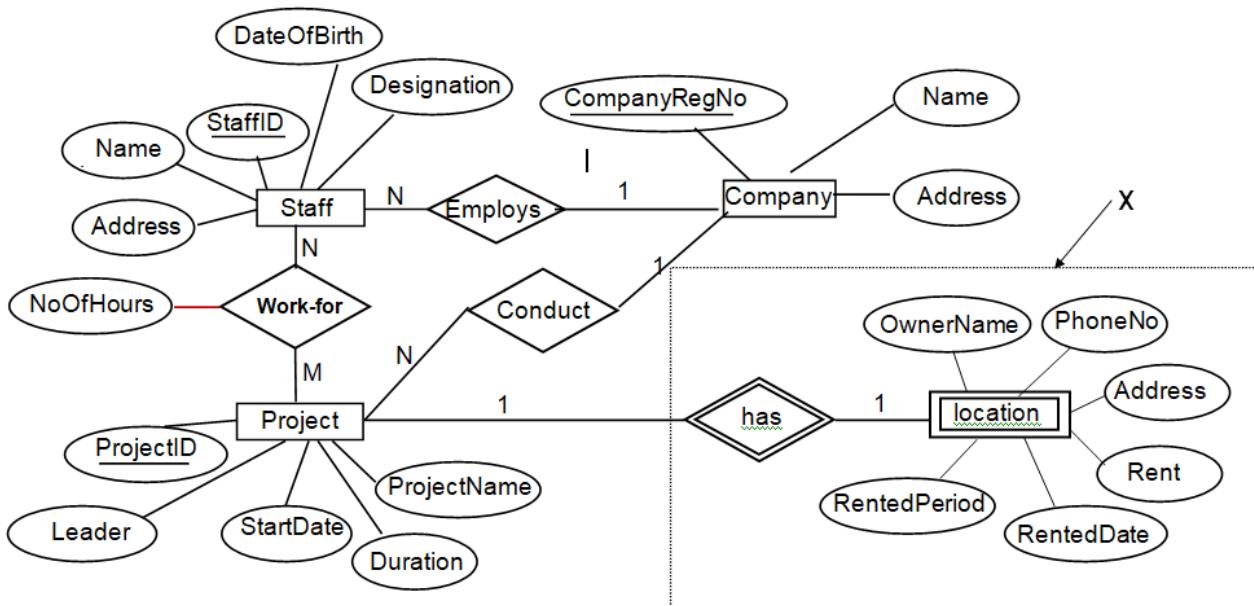
3 (a) (i) NoOfHours

[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

$Z = AB + BC + AC$

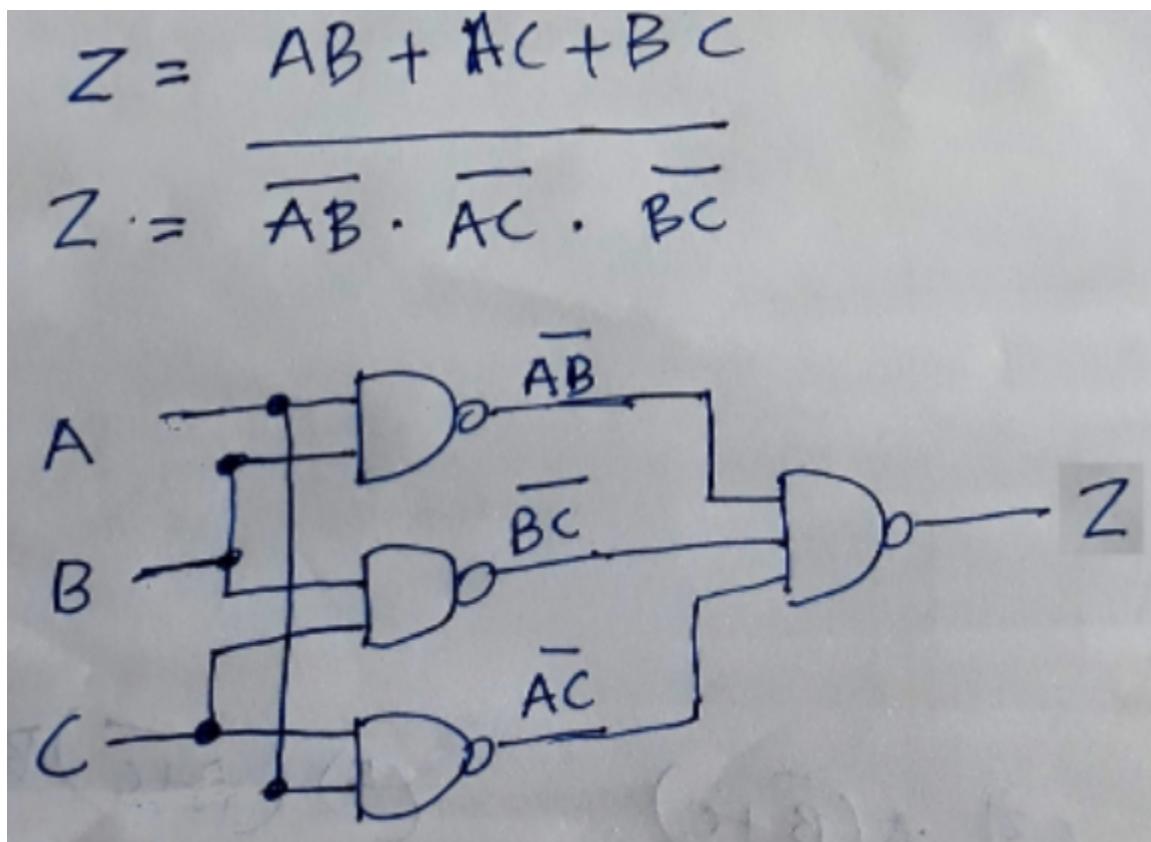
*Marks allocated as follows:***A: 1 mark for correct map entries****B: 3 marks for the three correct loops (1 mark X 3)****C: 2 marks for the final simplified expression**

(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.)

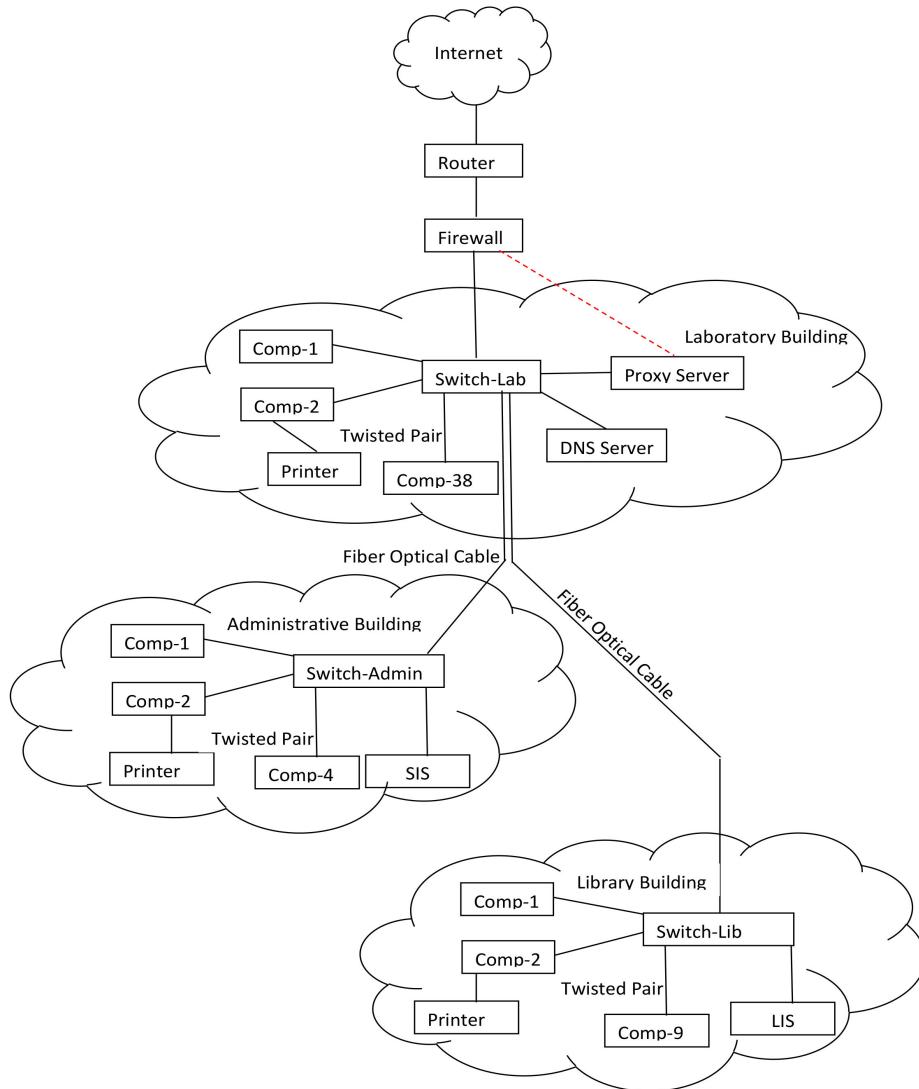
(b) Any one point from

[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[†] **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]
<ul style="list-style-type: none">• 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]
<ul style="list-style-type: none">• Advertising support / revenue• Subscription fees• Transaction fees / commissions	
(v) Any one from	[1]
<ul style="list-style-type: none">• 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]
<ul style="list-style-type: none">• 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]

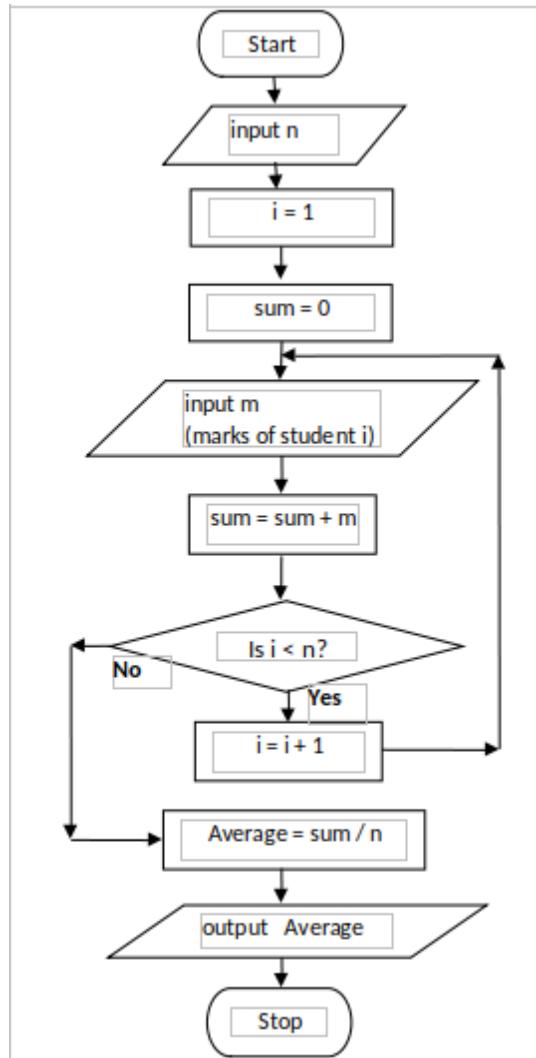
(v)

[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)

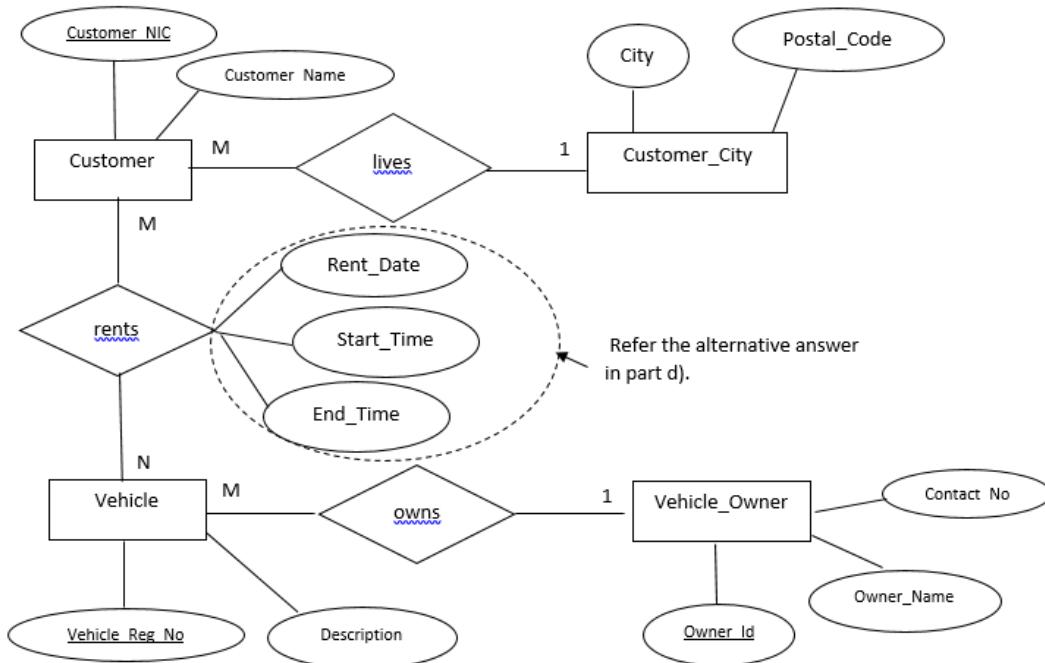
Relation III: **Any one** from

- 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:

- 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)