දිවයිනේ ජ්‍යෙෂ්ඨතම ICT ගුරුවරයාගේ 17 වන
වාර්ෂික මහා සම්මන්ත්‍රණය,

ICT 2025 A/L Final SEMINAR

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බුද්ධ ශ්‍රීමාල්

B.Sc (IT), SCS, RHCSA, CCNA

15th OCTOBER

8.00AM to 3.00PM

@ Sasip Nugegoda

Fee - Rs. 1500/=

More info :
071 77 88 014

G.C.E. (Adv. Level) Examination - 2023 (2024)

Information & Communication Technology - I

Answers

01.	①	②	③	④	**⑤**	26.	①	②	③	**④**	⑤
02.	①	②	③	④	**⑤**	27.	①	②	**③**	④	⑤
03.	①	②	③	④	**⑤**	28.	**①**	②	③	④	⑤
04.	**①**	②	③	④	⑤	29.	**①**	②	③	④	⑤
05.	①	②	③	④	**⑤**	30.	①	②	③	④	**⑤**
06.	①	**②**	③	④	⑤	31.	①	**②**	③	④	⑤
07.	①	②	**③**	④	⑤	32.	①	**②**	③	④	⑤
08.	①	**②**	③	④	⑤	33.	**①**	②	③	④	⑤
09.	①	**②**	③	④	⑤	34.	①	②	③	④	**⑤**
10.	①	②	③	**④**	⑤	35.	①	②	**③**	④	⑤
11.	①	②	③	**④**	⑤	36.	①	**②**	③	④	⑤
12.	①	②	③	④	**⑤**	37.	①	**②**	③	④	**⑤**
13.	①	②	**③**	④	⑤	38.	①	②	**③**	④	⑤
14.	**①**	②	③	④	⑤	39.	**①**	②	③	④	⑤
15.	**①**	②	③	④	⑤	40.	**①**	②	③	④	⑤
16.	①	②	③	④	**⑤**	41.	**①**	②	③	④	⑤
17.	①	②	③	④	**⑤**	42.	①	②	③	**④**	⑤
18.	①	②	③	**④**	⑤	43.	①	**②**	③	④	⑤
19.	①	②	③	**④**	⑤	44.	**①**	②	③	④	⑤
20.	①	**②**	③	④	⑤	45.	①	②	**③**	④	⑤
21.	①	②	③	④	**⑤**	46.	**①**	②	③	④	⑤
22.	①	②	③	④	**⑤**	47.	①	**②**	③	④	⑤
23.	①	②	**③**	④	⑤	48.	①	**②**	③	④	⑤
24.	①	②	**③**	④	⑤	49.	**①**	②	③	④	⑤
25.	①	②	③	④	**⑤**	50.	①	②	**③**	④	⑤

(01 × 50 = 50 marks)

++++

Part A - Structured Essay

1. (*a*) ✳ Cricket ✳ Football ✳ Hockey (1 mark)

(*b*)

Ⓐ : 7	Ⓑ : 8	Ⓒ : 14	Ⓓ : 1	Ⓔ : 18	Ⓕ : 15	Ⓖ : 5
Ⓗ : 16	Ⓘ : 4	Ⓙ : 17	Ⓚ : 11	Ⓛ : 20	Ⓜ : 2	Ⓝ : 12

(0.5 × 14 = 7 marks)

Note - If the same number is used in more than one occasion. no marks for any of them)

(*c*) **P** - Get the data entered to the form to variables $name etc

Q - Build the SQL query using those variables (1 mark for each) (1 × 2 = 2 marks)

(Total Marks - 10)

2. (*a*) 2nd :- management of data

3rd :- removal of obsolete data (0.5 marks for each - 1 mark)

(*b*) (i) Infrastructure as a service / (IaaS) (1 mark)

(ii) Write one of the following or similar to this answer

- Providing the use of quantum computers as a cloud service to the interested users
- Making it available through the cloud via Infrastructure as a Service (IaaS)

(2 marks - If the answer is complete as given above)

(1 mark - If the student has some idea but has not given an answer that is worth full marks)

(2 marks)

(*c*) (i) 7 (ii) 3 (iii) 6 (iv) 8 (v) 4 (2 marks - If all five correct)

(1 mark - If two or three correct)

(2 marks)

(*d*) (i) Write one of the following

- Economic and social inequality with regard to access to, use of or impact of information and communication technologies.
- The gulf between those who have ready access to computers and the internet and those who do not.
- The gap between demographics and regions that have access to modern information and communications technology (ICT), and those that do not or have restricted access.
- Unequal access to digital technology, including smart phones, tablets, laptops and the internet.
- The gap between people who have access to modern information and communications technology and those who do not.
- The distinction between those who have internet access and are able to make use of new services offered on the World Wide Web and those who are excluded from these services.
- The gap between those with Internet access and those without it.

- Some societies in the world have ready access to computers and the internet while some others do not. This gap between those who have and those who have not is known as digital divide.

(2 marks - If the answer is complete as given above)
(1 mark - If the idea is there but the answer is not worth for full marks)

(2 marks)

(ii) Write one of the following

- Minimizing e-waste through the 3R technique (Reduce, Reuse, Recycle)
- Reduce the unwanted / extravagant use of electronic equipment
  (eg: if one already has a working electronic item, it is good for him/her to not to buy another one)
- Reuse electronic equipment as much as possible
  (eg : a broken computer should be repaired if possible)
- Without throwing electronic items that cannot be repaired to garbage dumps, recycle them / their parts to other uses.
- If the electronic items have to be disposed, give them to designated e-waste recycling locations.
- Without buying new items buy refurbished items
- Extend the lifespan of items by protecting them, using proper maintenance practices, keeping them clean, regularly updating software, protecting them from virus attacks, using protective cases, using screen protectors, using surge protectors etc.
- Donate or sell unwanted electronics.
- Go for digital minimalism (eg : decluttering and organizing files, reducing unnecessary downloads and backups and deleting unused applications).

(2 marks - If the answer is complete as given above)
(1 mark - Some ideas are there in the answer but it is not worth for full marks)

(2 marks)

3. (*a*) Write one of the following answers **(Total Marks - 10)**

ALTERNATIVE 1

Ⓐ : no
Ⓑ : yes
Ⓒ : sum = sum + count / sum + = count
Ⓓ : yes
Ⓔ : count ≤ 18 ? / count < 19?
Ⓕ : no
Ⓖ : print sum / output sum / display sum / show sum

ALTERNATIVE 2

Ⓐ : no
Ⓑ : yes
Ⓒ : sum = sum + count / sum + = count
Ⓓ : no
Ⓔ : count > 18?
Ⓕ : yes
Ⓖ : print sum / output sum / display sum / show sum

(AB = 0.5, DF = 0.5, C = 0.5, G = 0.5, E = 1)

(*b*) (i) [4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30]

Marks allocated as follows.
(1.5 marks for correct list content)
(0.5 marks for [ ] and commas
(2 marks)

(ii) [5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29]

Marks allocated as follows
(1.5 marks for correct list content)
(0.5 marks for [ ] and commas)
(2 marks)

(*c*) Ⓐ: Any negative value / 0 / 1 / 2 / 3 / 4 / myList[0]
Ⓑ: myList
Ⓒ: largest:
Ⓓ: i
Ⓔ: largest
Ⓕ: list 1

(0.5 marks for each - 3 marks)
(Total Marks - 10)

4. (*a*) Ⓟ - [5] Ⓠ - [4] Ⓡ - [2] Ⓢ - [3]
Ⓣ - [6] Ⓤ - [7] Ⓥ - [8] ⓦ - [1]

(**Note** - If the same number is used in more than one label, consider all of them as wrong.)
(0.5 marks for each 0.5 × 8 - 4 marks)

(*b*) Write one of the following

- Authentication of student when he/she logs into the system.
- Computers to be available for reservation for weekend 30 minute time slots between 8 a.m. and 5 p.m.
- A student to be given a maximum of two 30 minute time slots.
- One computer to be reserved by only one student for a particular time slot. (1 mark)

(*c*) Write one of the following

- Whether it is technically possible to do the project.
- Whether it is possible to develop the product with the available technology in the school.
- Whether it is possible to add more technical resources if needed.
- Whether the chosen technology is the right choice to help the team complete the system within the budget and time allocated for the project or whether there are other better choices.
- Whether the school requires specific technology or is the school open to developing the product, irrespective of the technology.
- Whether open source software could be used.
- Whether the technical resources (software / hardware) are available.
- Whether the technical resources are adequate.
- Whether the technical team is capable to make a working system.
- Whether the system should be compatible with other existing systems in the school. (1 mark)

(*d*) In the waterfall model, each phase must be completed before the next phase can begin. Thus if the requirement analysis is not properly done during its phase then it is likely that a system that will be rejected by the customers will be developed. It will be very costly and time consuming to correct that mistake.

(1 mark)

(*e*) After the unit testing of the three modules are done, then the modules need to be integrated into a single system. Testing this single system as a combined unit is done during integration testing. (1 mark)

(*f*) Write one of the following

- more resources are needed for it
- it is more time consuming to maintain two systems
- it is more costly to maintain two systems
- it takes effort to keep the two systems consistent
- it can cause confusion and frustration
- as it is for school's own use, one need not take the effort of parallel deployment as any mistakes can be remedied comparatively easily
- this is not a high risk system that warrants a parallel deployment

(1 mark)

(*g*) Write one from the following

- it may not fit the school requirements
- customization restrictions
- vendor dependence
- integration challenges
- may have a higher cost
- the need for substantial training
- students missing a learning opportunity
- may not have Sinhala, Tamil language support
- may have unnecessary features
- may have licensing costs
- can be more expensive over time
- can be impossible or inflexible to change if one needs it
- school may not have control
- may not be supported after some time
- upgrades can cost extra
- it may not have the exact features the school needs.
- might not fit school's work processes.

(1 mark)

(Total Marks - 10)

++++

Part B

5. (a) (i)

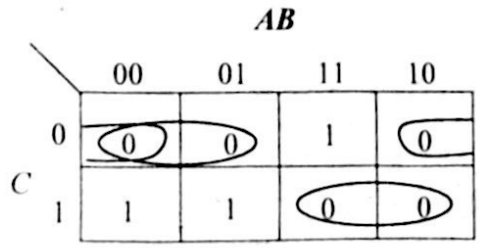
A	B	C	Z
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

(Marks given as follows)
(3 marks for all 8 rows correct)
(2.5 marks for maximum 6, 7 rows correct)
(2 marks for maximum 3, 4, 5 rows correct)
(1 mark for maximum 1, 2 rows correct)

(**Note** - If the Z column is not labelled or the label is different from Z / output 1 mark is reduced from the earned total marks for this question.)

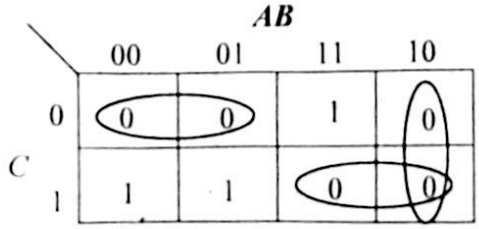
(3 marks)

(ii) **ALTERNATIVE 1**



(2 marks)

ALTERNATIVE 2



(0.25 marks for each correct cell) (2 marks)

(iii) Simplified POS expression for **ALTERNATIVE 1**

$Z = (\bar{A} + \bar{C})\ (A + C)\,(B + C)$

Simplified POS expression for **ALTERNATIVE 2**

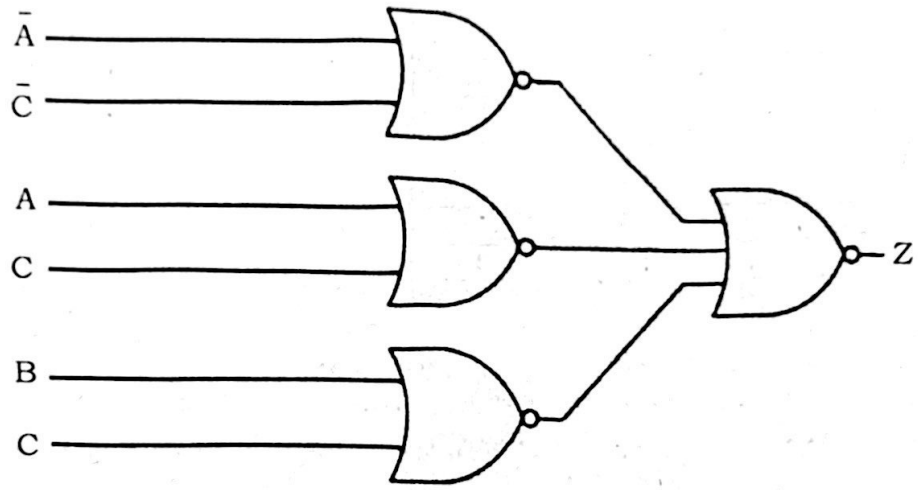
$Z = (A + C)\ (\bar{A} + \bar{C})\,(\bar{A} + B)$

Marks allocated as follows:
1.5 marks for marking the three loops on the correct Karnaugh map (0.5 marks for each)
1.5 marks for correct, simplified final POS expression for the used alternative

(2 ...

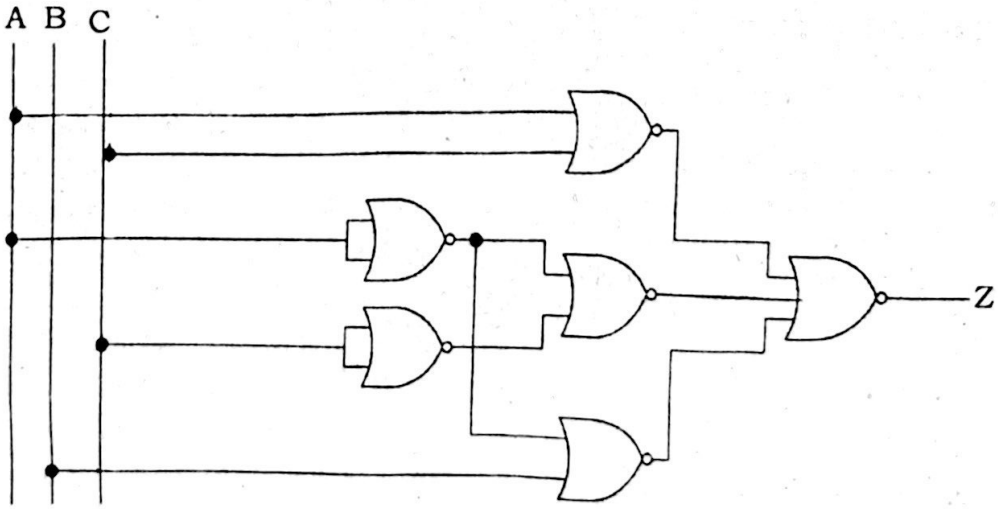
(iv) ALTERNATIVE 1

$Z = (\bar{A} + \bar{C})\ (A + C)\ (B + C)$



ALTERNATIVE 2

$Z = (A + C)\ (\bar{A} + \bar{C})\ (\bar{A} + B)$

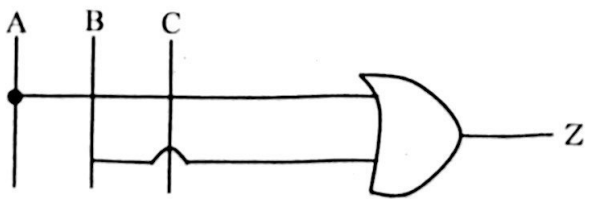


Marks allocated as follows :

- 1 - mark for the first set of NOR gates
- 1 - mark for the final NOR gate

(2 marks)

Note - If the wire connections are not clearly indicated on, on a correct circuit then you will be given only a maximum of 1 mark you must indicate the wire connections using the dark dots (as shown in the diagram) or use half circles to indicate non connecting wires.)



(*b*) $\overline{A}C + \overline{A}B + A\overline{B}C + BC = C\overline{A} + CA\overline{B} + CB + \overline{A}B$

$= C(\overline{A} + A\overline{B} + B) + \overline{A}B$

$= C(\overline{A} + A + B) + \overline{A}B$

$= C(1 + B) + \overline{A}B$

$= C + \overline{A}B$

✷ 2 marks if student uses correct steps to obtain the final expression
✷ 1 mark if only the first two steps are correct (2 marks)

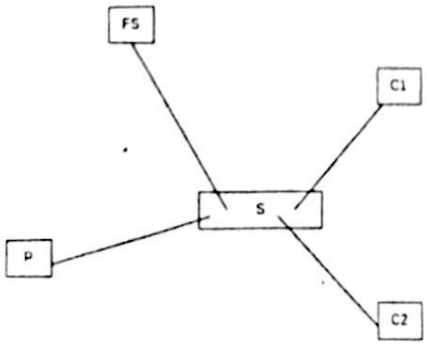
(*c*) (i) 1 (1 mark)

(ii) 1 (1 mark)

(iii) 0 (1 mark)

(Total marks 15)

6. (*a*)



The printer could be connected to one of the computers as well. (1 mark)

(*b*) It identifies the process that is relevent to the connection (1 mark)

(*c*) (i) An example IP address 192.168.56.138
Any answer that lies between 192.168.56.129 and 192.168.56.190 (both inclusive) is also acceptable. (1 mark)

(ii) First address : 192.168.56.129
Last address : 192.168.56.190
(0.5 marks for each - 1 mark)

(iii) 62 (1 mark)

(*d*) (i) 255.255.255.192 (1 mark)

(ii) 2 (1 mark)

(iii) **ALTERNATIVE 1**

Subnet	Network address	First usable IP address	Last usable IP address	Broadcast address
Subnet A	192.168.56.0	192.168.56.1	192.168.56.14	192.168.56.15
Subnet B	192.168.56.16	192.168.56.17	192.168.56.30	192.168.56.31
Subnet C	192.168.56.32	192.168.56.33	192.168.56.46	192.168.56.47
Subnet D	192.168.56.48	192.168.56.49	192.168.56.62	192.168.56.63

ALTERNATIVE 2

Subnet	Network address	First usable IP address	Last usable IP address	Broadcast address
Subnet A	192.168.56.32	192.168.56.33	192.168.56.38	192.168.56.39
Subnet B	192.168.56.40	192.168.56.41	192.168.56.46	192.168.56.47
Subnet C	192.168.56.48	192.168.56.49	192.168.56.54	192.168.56.55
Subnet D	192.168.56.56	192.168.56.57	192.168.56.62	192.168.56.63

(1 - mark for each correct row) (4 marks)

(*e*) (i) Write any two from the following

- Acting as an intermediary between the user's computer and the Internet / offering access to uncensored Internet / allowing client computers to make indirect network connections to other network services / helping users browse the web anonymously / providing a high level of privacy / hiding actual IP addresses of users.
- Storing recently requested web objects / pages for future requests
- reducing the time required to access web pages because of caching
- hiding a network from outside and thus securing that network / preventing attackers from entering a private network.
- forwarding web requests
- content filtering
- acting a firewall
- saving network bandwidth / improving network performance / network connection sharing
- helping control Internet usage of users

(1 mark for each $1 \times 2 = 2$ marks)

(ii) Write any two from the following

- They are 48 bits in length / They are divided into six blocks separated by colons. / It is a six byte hexadecimal address. / It is a 48-bit address that contains six groups of two hexadecimal digits separated by colons.
- They are physical addresses. / MAC address is hardware oriented. / They are hard - coded into the device. / They are attached to the network interface (host).
- They are assigned by the manufacturer.
- They are permanent. / They cannot be changed.
- They are unique addresses assigned to interfaces of a host. / MAC address sharing is not allowed.
- When data is sent, MAC addresses enable the unique identification of the device interface. / They uniquely identify the devices on a network / MAC addresses support the correct delivery of the data to the receiver's interface / A switch needs the MAC address to forward data.
- MAC address operates in the data link layer.
- MAC address cannot be found easily by a third party.

(1 mark for each $1 \times 2 = 2$ marks)

(Total marks 15)

7. (*a*) (i) A - USB Port - The function could be one of the following

- Could be used to connect a computer to the board
- Could be used to upload firmware into the micro-controller
- Could be used for data communication between the computer and the board

B - Analog input pins - Feed analog inputs to the micro-controller

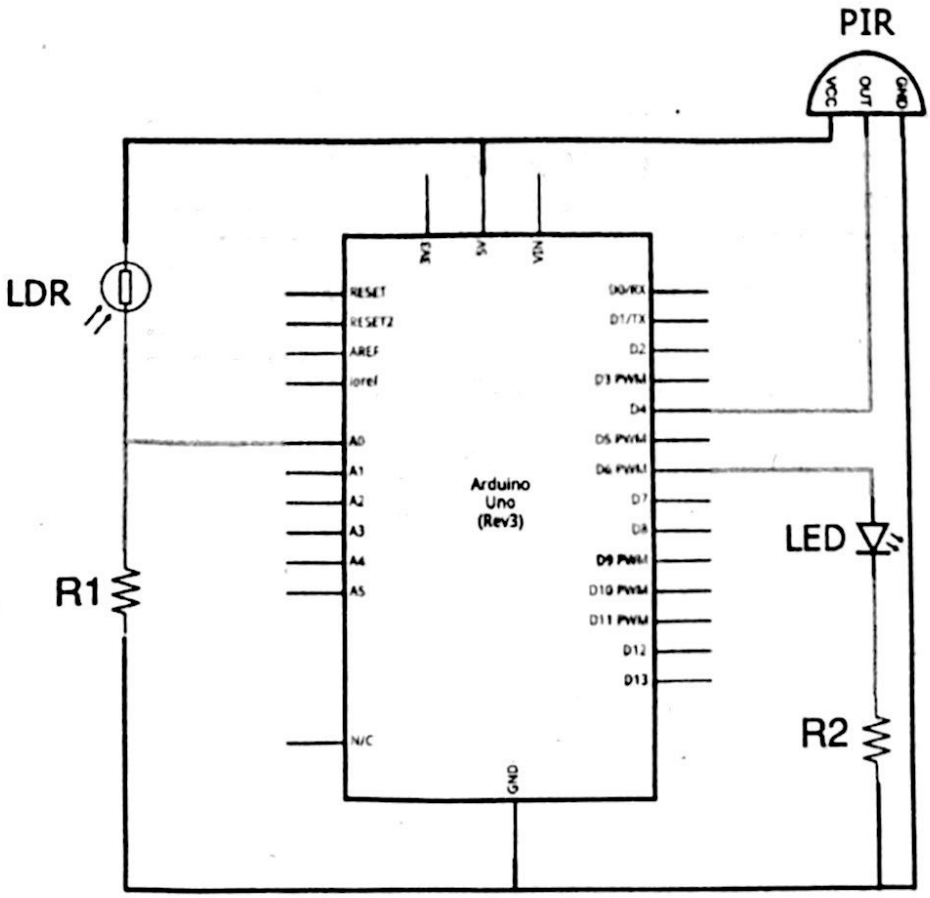
C - Micro controller - Any answer that clearly explains the task of processing inputs to Board and producing digital output based on the computations carried out.

D - Digital input / output pins - Feed digital inputs as well as deliver digital outputs

(0.5 marks for naming and 0.5 marks for describing each function)

(0.5 × 2 × 4 = 4 marks)

(ii)



(Complete pin details are not needed, but connecting pins must be named)

- 1 mark for the use of resistors R1 and R2 and correct ground / 5V connections.
- 1 mark for correct LDR connection to analog pins and LED to a digital pin
- 1 mark for correct PIR sensor output to another digital pin (3 marks)

(*b*) (i) (a) Autonomous - Can take decisions by themeslves without being controlled by the others (users or other agents)

(b) Cooperative - Can cooperate with other agents (or users) when performing tasks

(1 mark each - 2 marks)

(ii) Self autonomous agent : multi - agent robots

User agent :- either Delivery Handler Agent or Dispatch Handler Agent

(1 mark each - 2 marks)

(iii) There will be competitive behaviour among multi agent robots to complete their tasks which they try to complete individually.
eg : Loading area will be congested by the competing robots to pick the next package
(or each multi agent robot will see all other multi agent robots as obstacles to their work)

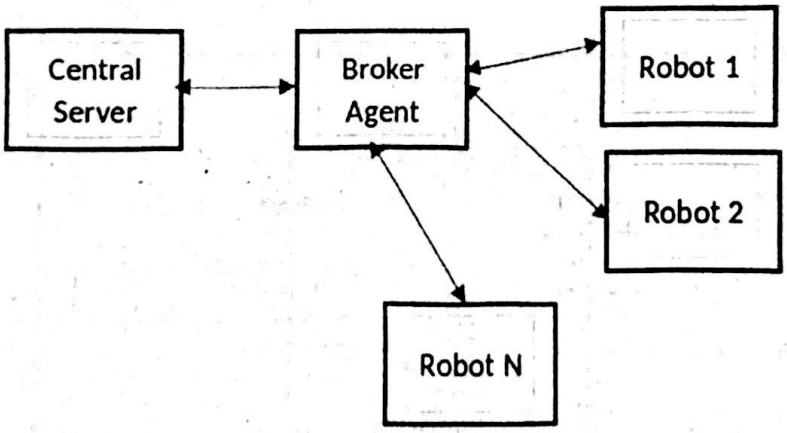
(1 mark)

(iv) (a) Each robot will only move based on the mobility instructions received from the central server

(b) The central server receives data, processes them at the server and instructs the robots to pick up the packages, move through the package moving area with respect to their dispatch assignements. Communication is facilitated through the broker agent.

(1 mark each - 2 marks)

(v)



(1 mark)

(Total Marks - 15)

8. (*a*) l*br*ry

(Note :- Exact answer with proper case required)

(2 marks)

(*b*) **P:** len(nList)-1
Q: 0
R: -1 (*+-- P,Q*)
S: for i in range(pNumber) (*+-- R*)
T: nList[i] = nList[i+1]
U: nList[i+1] = temp

ALTERNATIVE FOR P, Q, R AND S:
P: 0
Q: len(nList) OR len(nList)-1
R: 1 (*+-- P,Q*)
S:
for i in range(0, len(nList)-1) OR

for i in range(len(nList)-1) OR

for i in range(0, len(nList)-1-pNumber) (*+-- R*)

(Note :- Exact spelling and case required)

(3 marks)

(c) (i) **A: 0.5 marks** open
B: 0.5 marks not OR "" == OR '' ==(with no space between quotes)
C: 0.5 marks break
D: 1 mark empDetails[1]
E: 1 mark topay//notes[i]
F: 1 mark required[i] (←-- *E*)
G: 1 mark topay%notes[i] OR
topay - required[i]*notes[i] (←-- *E*)
H: 1 mark i = i + 1
I: 1 mark required[i] (←-- *E*)
J: 0.5 marks file.close() (←-- *A*)

For A, B, C and J (0.5 marks each)
For D, E, F, G, H and I (1 mark each) (8 marks)

(**Note :-** Exact spelling and case required)

(ii) Problem :- Can only handle net pay inputs that can be made with the notes in the notes array.
Eg :- It can not handle a net pay input like 40001 or 40010

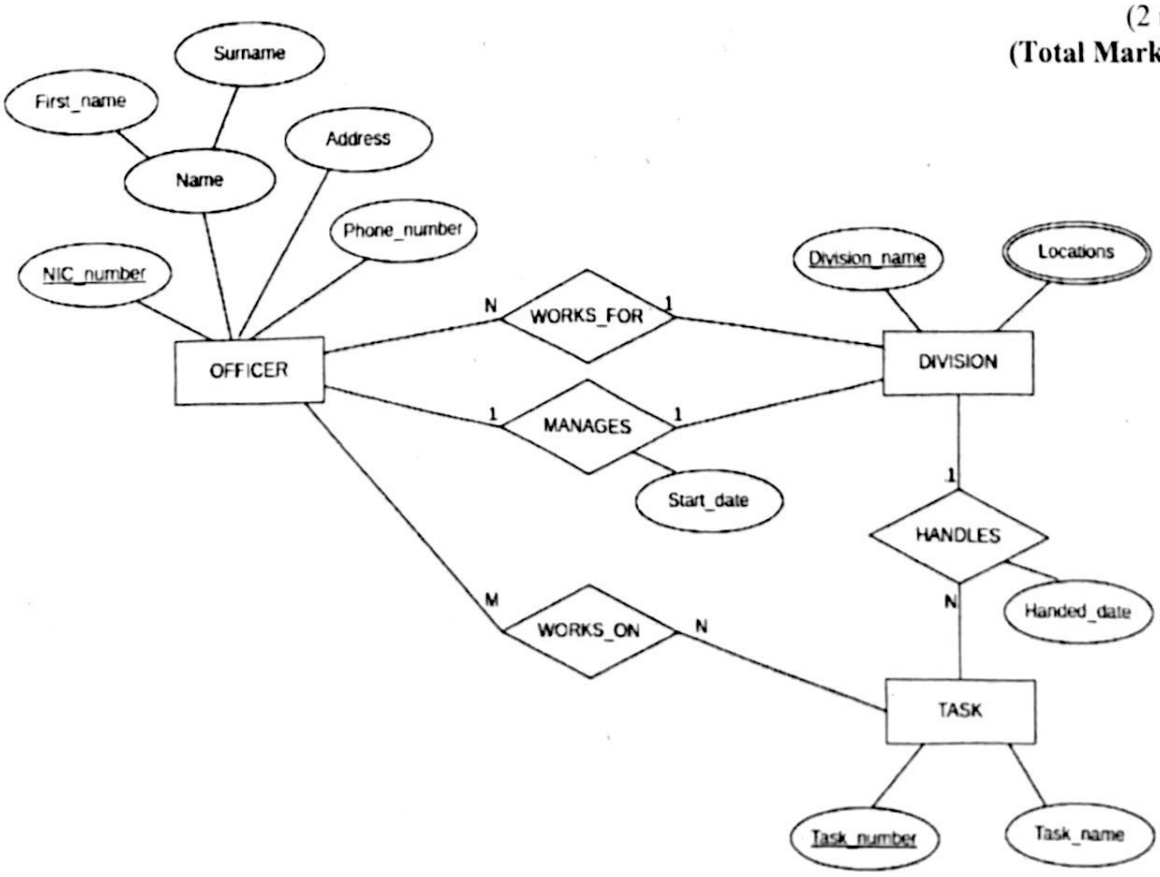
Solution :- There are two solution. Either one is acceptable

- Do not process if a net pay input is not devisible by either 50 or 20
- Increase the size of the arrays as follows
  notes = [5000, 1000, 500, 100, 50, 20, 10, 5, 2, 1]
  totals = [0,0,0,0,0,0,0,0,0,0]
  required = [0,0,0,0,0,0,0,0,0,0]

(1 mark for problem and 1 mark for solution)

9. (*a*) (2 marks)

(Total Marks - 15)



Marks allocated as follows:

- ✳ 1 mark for the three entities (with the key attribute underlined) connected through (correct or incorrect) relationships.
- ✳ 1 mark for indicating the Locations multi - valued attribute
- ✳ 1 mark for the four relationships with correct / incorrect cardinality
- ✳ 1 mark for indicating correct cardinality
- ✳ 1 mark for all attributes correctly being listed and connected properly

(5 marks)

(*b*) Write any two from the following

- minimizes the physical storage space required / reduces redundant data / reduces data duplication
- increases data integrity / provides data consistancy / prevents data anomalies
- supports efficient query response
- provides for a more flexible database design
- increases database security
- provides better and quicker execution
- making updates to data is easier because it need not be done in multiple places / easy to maintain
- references to a record can be changed without removing the record.
- reduces the risk of data entry errors.

(0.5 × 2 = 1 mark)

(*c*) (i) Second Normal Form / 2nd / 2NF

Justification : (Write one from the following)

- It is in 1NF and every field that is not part of the primary key is functionally dependent on the whole of the primary key.
- It is in 1NF and no partial dependencies. Therefore 2NF.
- It is in 1NF and is not in 3NF due to the transitive dependency. Therefore, 2NF.

(1 mark for the name of the form and 1 mark for justification) (2 marks)

(ii) ✳ A : Show (Theatre, Day, Time, Screen, Movie)

✳ B : Movie_Year (Movie, Year) (1 mark for each - 2 marks)

Note:- (Reduced 1 mark from the total if primary keys not underlined / spelling defects / case defects)

(*d*) (i)

```
CREATE TABLE Employee (
    Emp_ID VARCHAR(4) PRIMARY KEY,
    Emp_Name VARCHAR(50),
    DoB DATE,
    Department VARCHAR(50),
    Designation VARCHAR(50),
    DoJ DATE,
    Salary DECIMAL(10,2)
```

ALTERNATIVE :

```
CREATE TABLE Employee (
  Emp_ID VARCHAR(4),
  Emp_Name VARCHAR(50),
  DoB DATE,
  Department VARCHAR(50),
  Designation VARCHAR(50),
  DoJ DATE,
  Salary DECIMAL(10,2),
  PRIMARY KEY (Emp_ID)
);
```

Acceptable alternative data types :

Emp_ID CHAR(4)
Salary INT
Salary FLOAT(10,2)

Marks allocated as follows:

- 1 mark for correct CREATE TABLE Employee
  (Exact field names) (The semi - colon, exact spelling and case of field names)
- 1 mark for choosing Emp_ ID as the primary key AND the correct data type usage)

(2 marks)

(ii)
```
INSERT INTO Employee (Emp_ID, Emp_Name, DoB, Department, Designation,
DoJ, Salary)
VALUES ('E119', 'John', '15-06-1971', 'IT', 'Professor', '15-07-2001', 107000);
```

ALTERNATIVE: Field names can be omitted but the values for all columns must be there as shown below:

```
INSERT INTO Employee VALUES ('E119', 'John', '15-06-1971', 'IT', 'Professor',
'15-07-2001', 107000);
```

(**Note :-** The semicolon, exact spelling and case of table name and the field names are required.)

(1 mark)

(iii)

Emp_ID	Emp_Name
E110	Saman
E114	Jennifer
E119	John

(**Note :-** Exact spelling and case of field names and values are required)

(1 mark)

(iv)
```
SELECT Emp_Name
FROM Employee
WHERE Department = 'Civil';
```

(**Note :-** The semicolon, exact spelling and case of field names and the text (Civil) are required)

(1 mark)

(Total Marks - 15)

10. (*a*) (i) Fetching instructions - decoding and executing them / Fetch - Decode - Execute / Fetch - execute (1 mark)

(ii) The operating system's (1 mark)

(iii) n (1 mark)

(*b*) (i) FP (1 mark)

(ii) OS (1 mark)

(*c*) fileReader (1 × 2 - 2 marks)
As there is file reading in it (1 mark)

(*d*) PCB of the fileReader process (1 mark)

(*e*) (i) 2^{18}

(ii) p = 20
q = 22 (1 × 2 - 2 marks)

(iii) 8193 (1 mark)

(*f*) (i) 218 (1 mark)

(ii) Any size between 4 - 8 KB (1 mark)

(iii)

218	220
219	-1
220	219

(**Note :-** Blocks from 218 should be drawn in sequence)

(1 mark)

(Total Marks - 15)

✦✦✦✦