රහස්‍යයි
அந்தரங்கமானது

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்

ජාතික ඇගයීම් හා පරීක්ෂණ සේවාව
தேசிய மதிப்பீட்டிற்கும் பரீட்சித்தலுக்குமான சேவை

අ.පො.ස. (උ.පෙළ) විභාගය 2011
க.பொ.த.(உயர்தர)ப் பரீட்சை 2011

විෂයය / பாடம் } Information & Communication Technology

විෂයය අංකය / பாட இலக்கம் } 20

ලකුණු දීමේ පටිපාටිය - I පත්‍රය
புள்ளி வழங்கும் திட்டம் - பத்திரம் I

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

All media give ma...

Information and Communication Technology (Paper No 20)
Paper II – A
Marks Allocated 10 x 4 = 40
A -75,B – 65, C-55, S - 35

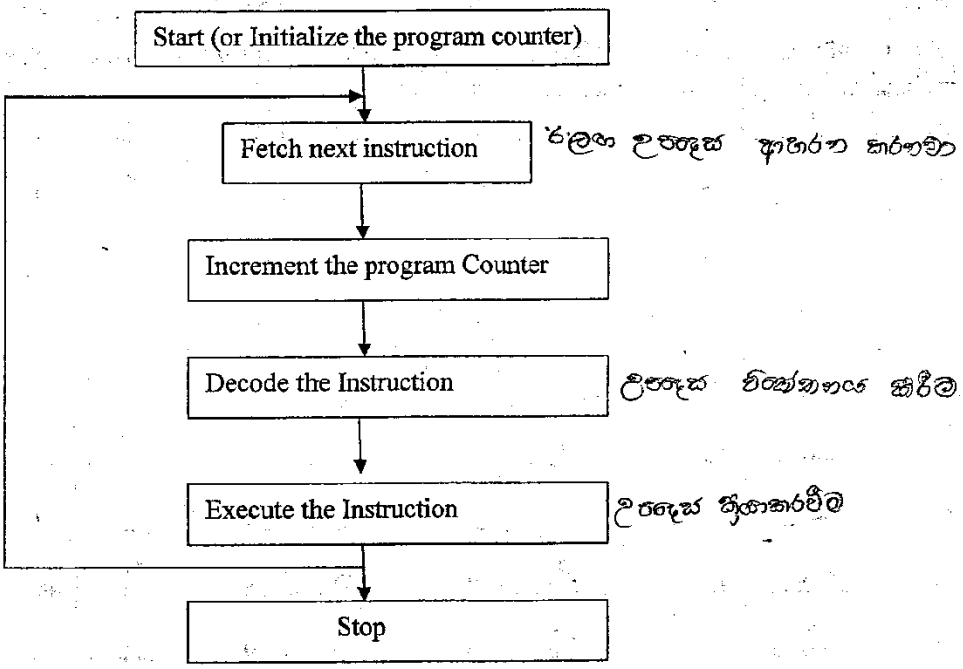
1.

a) First Generation (1GL) : Electronic valves or Vacuum Tubes
Second Generation (2GL) : Transistors
Third Generation (3 GL) : Integrated circuits(ICs) සංයුක්ත, අනුකාලීන,
Fourth Generation (4 GL) : Large Scale Integration (LSI) ,Very large scale Integration (VLSI), Microprocessors

Total 4 Marks

- **One marks for each correct answer**

b)



Total 2 Marks

- Three states **fetch, decode, execute** items in correct order (2) Marks
- Any two items fetch, decode, execute in correct order (1) Mark

c)

5 = > 0000 0101
3 => 0000 0011
-3 => 1111 1100 + 0000 0001 => **1111 1101**

Total 2 Marks

- **Correct representation of 5 1 Mark**
- **Correct representation of -3 in twos's complement 1 Mark**

0000 0101
1111 1101 +

1carry 0000 00 10

1 Mark

A carry out of the most significant bit is ignored in two's complement addition.

1 Mark

2)

a)

	FAT32	NTFS
Max file size	**limited**/unlimited	limited/**unlimited**
Max file name length	**limited**/unlimited	limited/**unlimited**
Security	yes/**no**	**yes**/no
Support of Unicode.	yes/**no**	**yes**/no

Total 3 Marks

- **All 8 answers are correct – 3 Marks**
- **4,5,6 or 7 correct answers – 2 Marks**
- **1,2,or 3 – 1 Mark**

b)

i) Total number of pages = $2^6 = 64$

Total 2 Marks

- **$2^6 = 64$ 2 Mark**
- **2^6 1 Mark**

(because of computation)

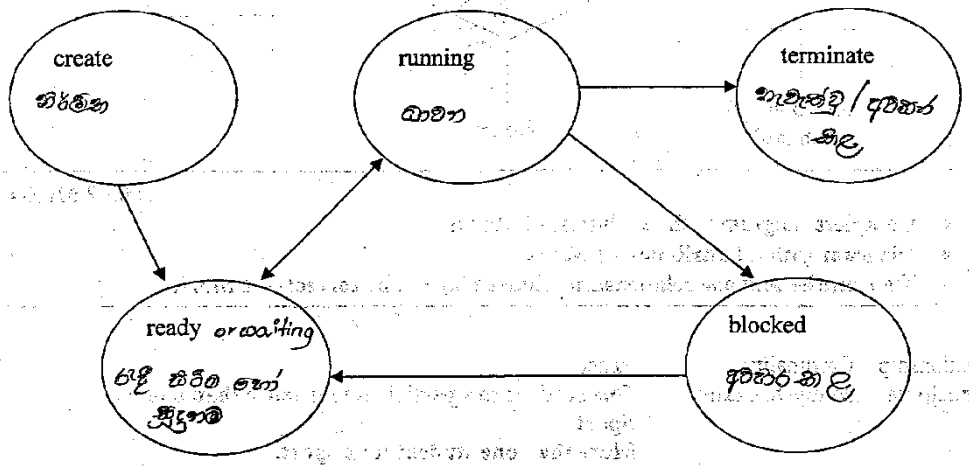
ii)

[010111 | 000000111100]
Page displacement

Total 1 Mark

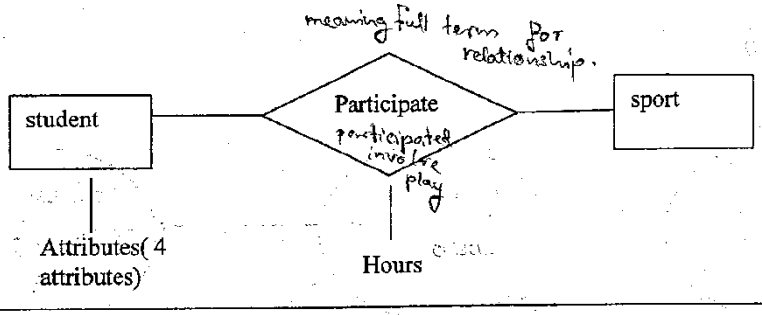
- **Both page and displacements are correct 1 Mark (No marks for partial answers)** — with identification.
- **If at least page and displacement is identified 0.5 Marks**
  — only separation is been done 0.5

c)



Total 4 Marks
All 5 states with arrows in the correct directions– 4 Marks. **Create, Ready, Running, Terminate with arrows in the correct directions – 3 Marks.** **All five states of the above 4 states (arrows in wrong direction or without arrows)– 2 Marks** **Any two states – 1 Mark** (with without arrows)

3) a)



Total 2 Marks

- **Complete diagram with attributes – 2 Marks**
- **Diagram without attributes – 1 Mark**
- **Two entities and one relationship (names may not be correct) – 1 Mark**

b)

Relationship	Cardinality	Reasons
Participate	**Many-to-many**	**One student can participate for more than one Sport.** **More than one student for a sport.**

Total 1 Marks

- **All correct**

c) False or not correct

1 Mark

True

0 Marks for the section, No marks for explanation

Reason :
No of hours is defined as an attribute on the participate relationship

1 Mark

d)

Two weaknesses

1) **Data duplication or any statement implying this.**
2) **Attribute 'Hours' on the relationship 'Participate' is excluded in the table**

Total 2 Marks

- **1 Mark for each**

Student table with the attributes Admission No, Name, Address, Class

Total 1 Mark

Sport table with attribute – Sport Code, Sport Name

Total 1 Mark

Participate relationship with attributes Admission No, Sport Code, No of Hours

Total 1 Mark

4)

a)

Linux – System Software
Word Processor – Application Software
Web Browser – Application Software

Total 2 Marks

- **All three correct – 2 marks**
- **Any two correct – 1 Marks**

b)

Magnetic – Hard disk, Diskette, Tape Drive (Any one)
Optical – CD, DVD,VCD ,blue-ray
Solid State – Flash Drive, Memory cards

Total 3 Marks

- **All six correct – 3 marks**
- **All 3 types without any examples – 2 Marks**
- **Any four or five correct – 2 Marks**
- **Any one, two or three correct - 1 Mark**

Only Examples without media will not be given any marks

c)

Data Element	Validation Check
Employee Number	Presence in Employee Master Table
Hours worked	Range check
Department code	Presence in Department Master
Week number	Range check

Total 3 Marks

- **All 4 correct – 3 marks**
- **Two or three – 2 Marks**
- **One correct - 1 Mark**

d)

Video Conferencing : This is the process by which **two or more individuals**, located in **different places** carry out a **discussion(communication)** through network by transmitting audio and video.

1 - Mark

Copyright : The right of the author to copy, print and market his/her material.

1 - Mark

03/09/2011

Information and Communication Technology (Paper No 20)
Paper II – B
Marks Allocated 15 x 4 = 60
A -75,B – 65, C-55, S – 35

a) Three components
- ALU
- CU
- Registers

[0.5 Marks * 3 = 1.5 Marks]

ALU
- Performs mathematical calculations.
- Perform comparisons of data.

CU
- Performs all the functions of a computer system. (*)
- Decodes instructions in the memory.
- Sends signals to the relevant components.

Registers
- Temporarily store data and instructions until they are send to the ALU.
- Stores processed data (results) until sends to the main memory (storage device)

[For any answer from each category 0.5 Marks * 3 = 1.5 Marks]

b) Storage compaction is needed to bring **all used storage** to **one end of the storage** in order to **claim unused/usable storage** space for **efficient use.** Secondary Storage only. ✓

main memory. ✗ **[0.5 Marks * 4 = 2 Marks]**

c) File size = 10,400 bits = 1,300 bytes
Size of a cluster = 512 bytes.
Therefore number of clusters needed for the file = 3

[1 Mark]

Total size of 3 clusters = 512 x 3 Bytes = 1,536 bytes
Wastage of space = 1,536 – 1,300 = 236 Bytes

[0.5 marks x 2 = 1 Mark]

(All 2 marks)

8 bits = 1 byte

10400 bits = $\frac{10400}{8}$ bytes

= 1300 bytes.

1. (d).

(i). Solution 1

A	B	C	D	F(A,B,C,D)
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

OR

Solution 2

A	B	C	D	F(A,B,C,D)
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

[0.25 x 16 = 4 Marks]

(ii) Solution 1

$F(A,B,C,D) = \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}CD + AB\bar{C}D$

~~$F(A,B,C,D) = \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + AB\bar{C}D + ABCD$~~

OR

~~$F(A,B,C,D) = \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + AB\bar{C}D + ABCD$~~

Solution 2 $F(A,B,C,D) = \bar{A}\bar{B}\bar{C}D +$ [2 Marks]

(iii) Logic Circuit

- ~~$F(A,B,C,D) = \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + AB\bar{C}D + ABCD$~~

~~OR~~

- ~~$F(A,B,C,D) = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + AB\bar{C}D + ABCD$~~

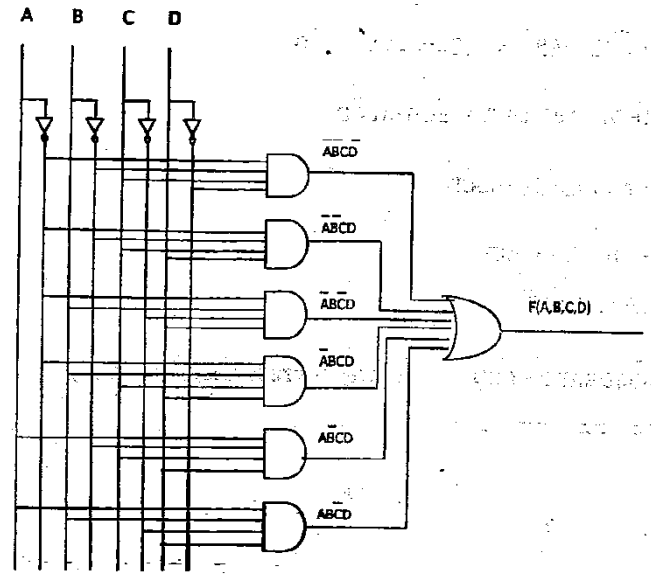
~~OR~~

- Simplified Boolean Expression [2 Marks]

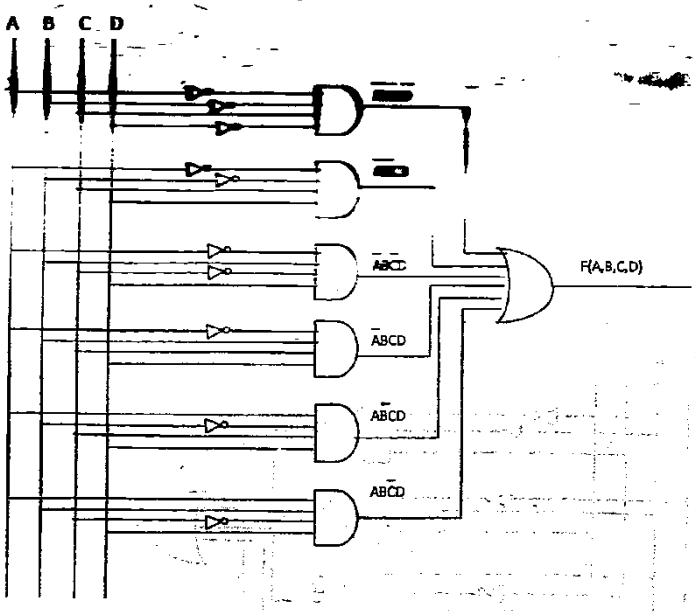
(As given below)

3

Logic circuit for $F(A,B,C,D) = \bar{A}\bar{B}\bar{C}\bar{D}+\bar{A}\bar{B}CD+\bar{A}B\bar{C}D+\bar{A}BC\bar{D}+A\bar{B}\bar{C}D+A\bar{B}C\bar{D}$



OR



OR

1st solution

Simplified Boolean Expression using Boolean algebra or Karnaugh map

$F(A,B,C,D) = \bar{A}\bar{B}\bar{C}\bar{D}+\bar{A}\bar{B}CD+\bar{A}B\bar{C}\bar{D}+\bar{A}BCD+AB\bar{C}D+AB\bar{C}\bar{D}$

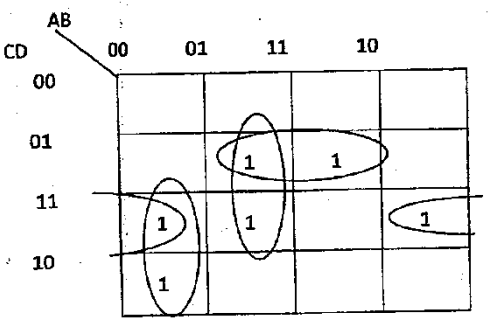
$= \bar{A}\bar{B}C(\bar{D}+D) + \bar{A}BD(\bar{C}+C) + A\bar{B}CD + AB\bar{C}\bar{D}$

$= \bar{A}\bar{B}C + \bar{A}BD + A\bar{B}CD + AB\bar{C}\bar{D}$

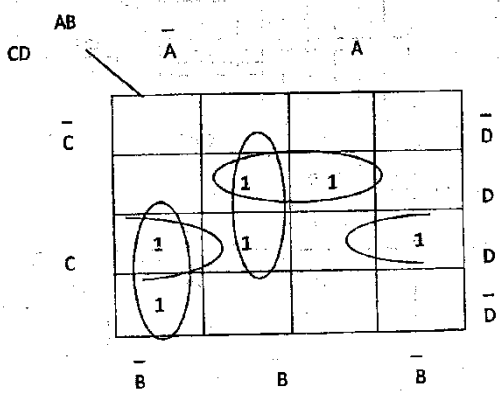
$= \bar{B}C(\bar{A}+AD) + BD(\bar{A}+A\bar{C})$

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

$= \bar{A}\bar{B}C + \bar{B}CD + \bar{A}BD + B\bar{C}\bar{D}$ **(or any correct simplification)**



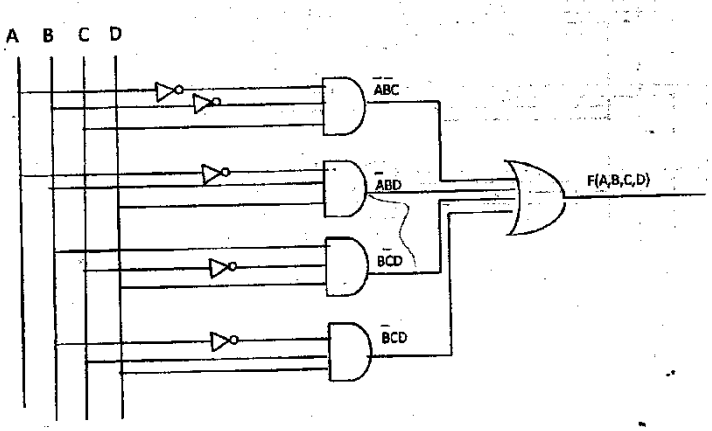
OR



*

$F(A,B,C,D) = \bar{A}\bar{B}C + \bar{A}BD + B\bar{C}D + \bar{B}CD$

**

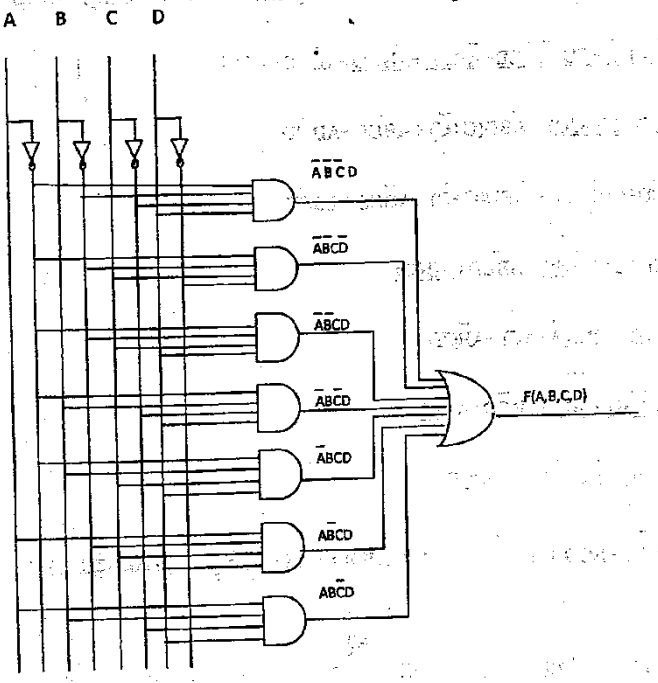


Solution 1

Logic circuirt for

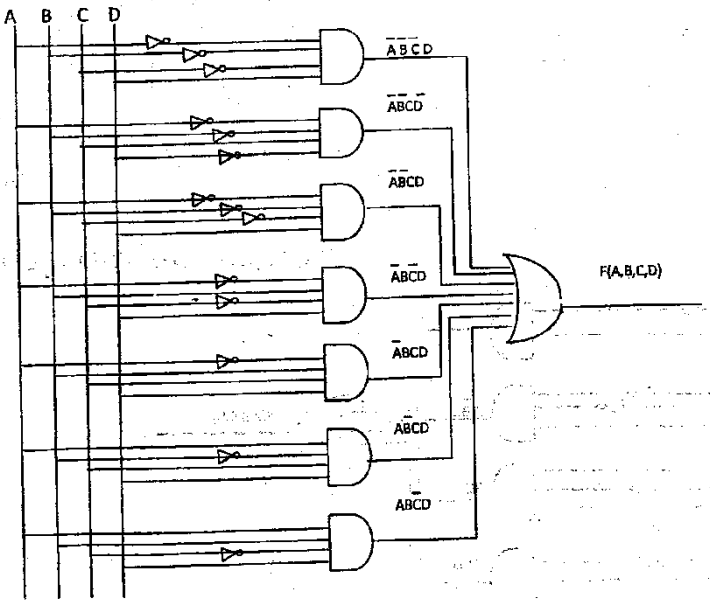
- $F(A,B,C,D) = \bar{A}\bar{B}\bar{C}D+A\bar{B}\bar{C}D+\bar{A}\bar{B}C\bar{D}+A\bar{B}C\bar{D}+\bar{A}B\bar{C}D+\bar{A}BC\bar{D}+AB\bar{C}\bar{D}$

**



**

OR



Solution 2

15

6

OR

Simplified Boolean Expression using Boolean algebra or Karnaugh map

$$F(A,B,C,D) = \underline{\bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD} + \underline{\bar{A}B\bar{C}D + \bar{A}BCD} + A\bar{B}CD + AB\bar{C}D$$

$$= \bar{A}\bar{B}(\bar{C}D + \underline{C\bar{D} + CD}) + \bar{A}BD(C+\bar{C}) + A\bar{B}CD + AB\bar{C}D$$

$$= \bar{A}\bar{B}(\bar{C}D + C(\bar{D}+D)) + \bar{A}BD(C+\bar{C}) + A\bar{B}CD + AB\bar{C}D$$

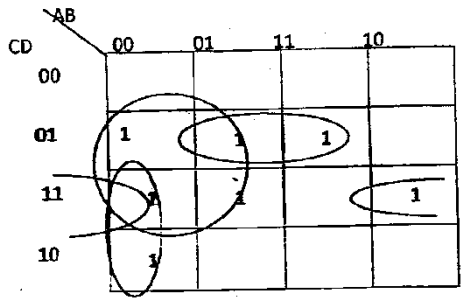
$$= \bar{A}\bar{B}(\bar{C}D + C) + \underline{\bar{A}BD} + A\bar{B}CD + \underline{AB\bar{C}D}$$

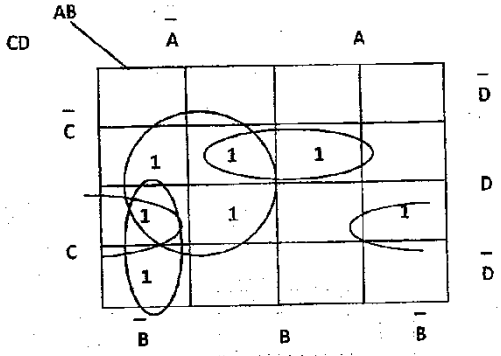
$$= \bar{A}\bar{B}(C+D) + BD(\bar{A}+A\bar{C}) + A\bar{B}CD$$

$$= \underline{\bar{A}\bar{B}C} + \underline{\bar{A}\bar{B}D + \bar{A}BD} + B\bar{C}D + \underline{A\bar{B}CD}$$

$$= \underline{\bar{A}D(\bar{B}+B)} + \bar{B}C(\bar{A}+AD) + \underline{B\bar{C}D}$$

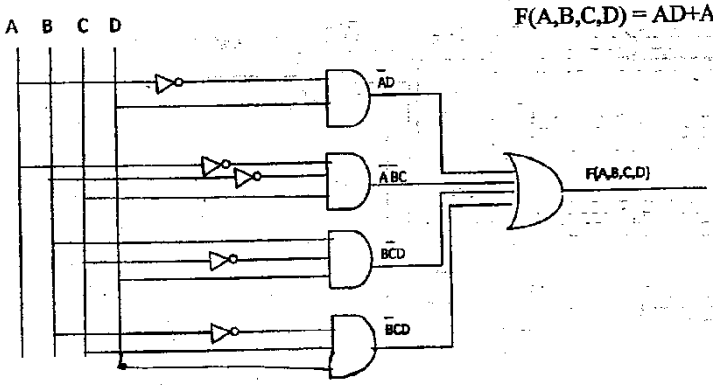
$$= \bar{A}D + \bar{A}\bar{B}C + B\bar{C}D + \bar{B}CD$$ **(or any correct simplification)**





**

$$F(A,B,C,D) = \bar{A}D + \bar{A}\bar{B}C + B\bar{C}D + \bar{B}CD$$



any simplify expression and (Suitable) Relevant circuit give marks

Solution 2

2. (a)

Elements :

- HTML documents are defined by HTML elements.
- Content starts with a valid tag and terminated with a valid corresponding tag.

[Any answer - 1 mark]

Attributes :

- Attributes provide additional information about elements.

[1 marks]

(b)

(i) br: element - forces a line break wherever you place it.
(ii) href: Attribute defines the link "address".
(iii) src: attribute specifies the location of the image file
iv) html: element defines the whole HTML document

~~**[0.5 mark for each = 2 Marks]**~~

[0.25 Mark for each element and functionality × 8 = 2 Marks]

have to identify the element or attribute.

(c) (i) p{ color:blue; font-family:arial; font-size: 14pt}

[2 marks]

If the complete answer is not given sub-sections of the written answer can be given marks as below.

- p{ color:blue; font-family:arial; font-size: 14pt}
  [If both underlined component are given - .5 mark]
- p{ color:blue; font-family:arial; font-size: 14pt}
  [For each underline component - .5 mark for each]

(ii) Creates

- an anchor link
- when the user clicks on the image icon, "elephants_tnl.jpg", an image named "elephants.jpg" is loaded in a different web page.
- If the browser can't load the image "elephants_tnl.jpg" it displays the alternate text "Tour to Yala".
- The width and height of the image"elephants_tnl.jpg" are 288cm and 156 cm respectively.
- Turns off the border.

[0.5 marks for each = 3 Marks]

Note: The 2nd bullet contains two correct segments.

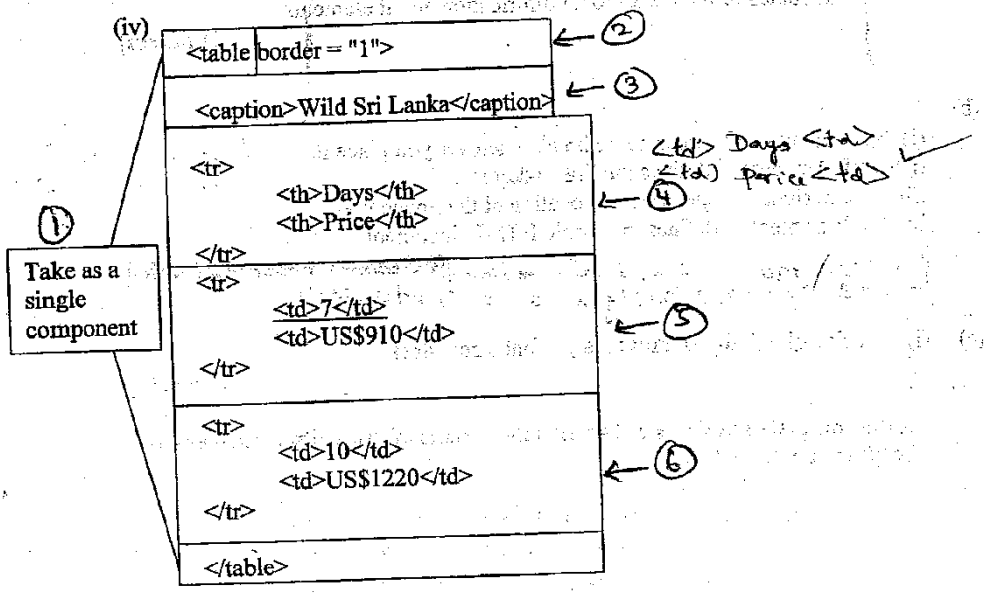
(iii) <input type = "radio" name = "visit" value = "Whale" >Blue Whale

[Each underlined component 0.5 marks * 4 = 2 marks]

<input type = "radio" name = "visit" value = "Leopard" >Leopard
<input type = "radio" name = "visit" value = "Elephant" >Elephant

[0.5 mark for each = 1 marks]

(iv)



[0.5 marks for each component *6 = 3 Marks]

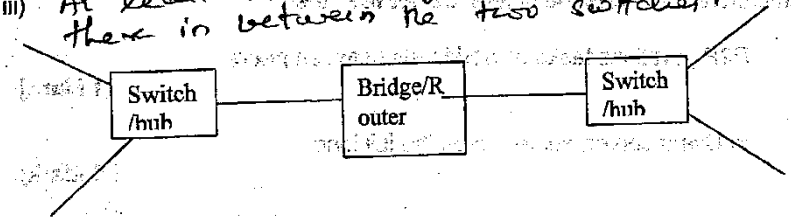
Question 3

1)

a) i) 255.255.255.240 **[marks 2]**

ii) Router or Bridge or
L3 Switch. (Layer 3 Switch)
[marks 1]

iii) At least one Bridge or Router should be there in between the two switches.



[Correct Answer Marks 2

Partial Marks - Two segments drawn with with no link - 1 Mark]

Gateway address of network 1: 10.32.5.x where x = 1....14
Gateway address of network 2: 10.32.6.y where y = 1..14
[each correct answer 1 * 2 = marks 2]

IP addresses of computers network 1

10.32.5.n where n = 1..14 **but not x**

[marks 1]

IP addresses of computers network 2

10.32.6.m where m = 1..14 **but not y**

[marks 1]

[Do not give marks for duplicate ip numbers]

b).

i. Compare TCP and UDP protocols in terms of reliability

TCP reliability high,
UDP is unreliable. **[2 Marks]**

ii. Peer-to-peer (P2P) and client-server models are distributed application architectures. Discuss the difference between them.

P2P partitions tasks or workloads between peers **[1 Mark]**

In Client server, server takes the full load. **[1 Mark]**

iii. Distinguish between hubs and switches in a network.

no intelligent Hub : When a packet arrives at one port, it is copied to all the other ports. (broadcasting) layer 1

Inteligent Switch : When a switch receives a packet, it sends the packet only to the particular destination port. **[1 for each x 2 = 2 Marks]**

Switch – layer 3.

[illegible] System Analysing [illegible]

Fasility is available – Availability is non functional.

Fasility is (functioning) use – Use is functional.

Question 4

a)

- Requirement (Elicitation and) Analysis.
- System Design.
- Implementation/Coding.
- Testing
- Maintenance.

At least these steps. (in Tim 7 steps)

[0.5 for each item identification x 5 = 2.5 Marks] (5)
[0.5 for each item description x 5 = 2.5 Marks]

b) Functional requirements:

- Services expected by the user or
- Services provided by the system.

Non-Functional Requirements:

- System constraints/ limitations.

[1 for each x 2 = 2 Marks]

Service ඇත functional
[illegible]
non functional.

Mobile phone- functional:

battery charge

- **Make a call,**
- receive a call,
- send an SMS,
- receive an SMS

- Camera taking a photo by using camera in a phone

[illegible]

two 2 1.0

[0.5 for any correct answers up to ~~three~~ x ~~3 = 1.5~~ Marks]

Mobile phone- non-functional:

- Size, dual size - non functional.
- price,
- battery life time, electricity [illegible]
- memory capacity,
- appearance

three 1.5

[0.5 for any correct answer up to ~~two~~ correct answers x 3 = ~~1~~ Marks]

a) *Maintenance: Necessary modifications to meet the changing requirements.

Requirment Analysis: Identification of user requirements.

System Design: Development of a conceptual model to represent the actual system, which can be implemented

Implementation: convert the conceptual model to a collection of ~~computer~~ executable computer programs.

[illegible] Identify the existance of errors and error 12

c) Unit testing:

- Purpose: To test the individual source programs for logical errors.
- People: Programmer/Software Engineer who developed the source code/program

Integrated testing:

- Purpose: Unit tested source codes are combined as a group and test for (functionality, performance, and/or reliability) errors due to the integration.
- People: software engineers/programmers, senior SE/team lead/ project manager development people only)

Acceptance testing:

- Purpose: To test the requirements of a specifications or contract are met.
- People: people from software development team and clients/end users.

[0.5 for each purpose x 3 = 1.5 Marks]
[0.5 for each correct people involved x 3 = 1.5 Marks]

d)

Any explanation with the following key features is acceptable.

Decide the functionality **[0.5 Marks]**

Decide the expected output **[0.5 Marks]**

Conduct the test **[0.5 Marks]**

Compare the actual behavior with the expected one. **[1 Mark]**

5.

(a)

Computer (processor) cannot understand programs written in **any language other than machine code**. Therefore language translators are needed to translate such programs to **machine code** prior to their execution.

[2Marks]

1 x 1 = 2

(b)

First generation languages :

1) In Machine Code.
2) Execute very fast compared to other generation languages.
3) Tied up with the machine architecture.
4) Translators are not need to execute programs.

Second generation languages:

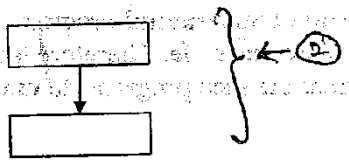
1) In assembly language
2) Mapping between assemble instructions and machine instruction is usually 1-1
3) Tied up with the machine architecture.
4) Assembler is needed to execute the program

Two features from each generation 2 – Mark

- **Each correct answer 0.5 subjected to maximum 1 for each generation.**

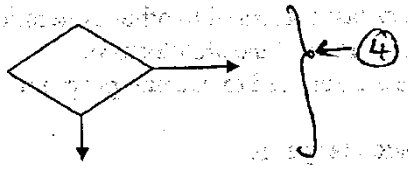
(c)

i. Sequence ← (1)

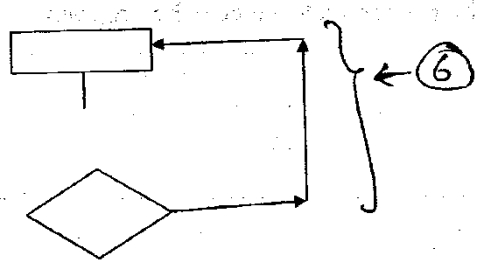


Element of the diagram can be any valid item. Only the sequence of one instruction followed by the other is important.

i. Branching (decision) ← (3)



ii. Iteration (repetition) ← (5)



6x0·5=3

All three control features are correct with the flow charts – 3 Marks

- **Each correct answer = 0.5 marks** (item on flowchart)

15

(d) (i)

```
1    x = int(input("Enter an integer ->)
2    while x != 0 :
3    bn = "" 
4        while x > 1:
5            quotient = int(x /2)
6            remainder = x %2
7            bn =bn +  str(remainder);
8                x = quotient
9            bn = str(x) + bn
10       print ("Binary Number -", bn)
11       x = int(input("Enter your number ->)
```

Syntax errors

a) Line No 1
   i. String is not closed properly (")
   ii. Need one more close bracket (")(")

b) Line No 3
   i. bn variable should be right indented.

c) Line No 6
   i. Assignment operator should ne = not ==

d) Line No 7
   i. No line terminator (";")

e) Line No 8
   i. Line should be indented with the previous line.

f) Line 11
   i. String is not closed properly (")
   ii. Need one more close bracket (")(")

All 8 correct with reasons – 4 Marks

- **Each correct ~~error~~ line identification of an error 0.25 marks, error ~~correction~~ identification 0.25 mark**

(ii)

Logical errors

a) Line 7 should be

bn = str(remainder) + bn

If the order on the right hand side reversed, The binary number would be in the reverse order.

b) Line 9 should be aligned with line 4 to capture the last bit.

```
3     x = int(input("Enter an integer ->"))
4     while x != 0 :
3        bn = ""
4        while x > 1:
5              quotient = int(x /2)
6              remainder = x %2
7              bn = str(remainder) + bn
8              x = quotient
9        bn = str(x) + bn
10       print ("Binary Number -", bn)
11       x = int(input("Enter an integer ->"))
```

All 2 corrections – 4 Marks

- **Each correction – 2 Marks**

6. (a) For this question valid business entities are

- Manufacture
- Wholesaler
- Retailer
- Service Provider

(i) Business to Business – Describes **electronic commercial transaction between businesses.**

[Each bold point 0.5 Marks x 2 = 1]

In the example both parties should be business entities.

Example : Delivering motor vehicles by the manufacturer to the wholesale dealer through on-line transactions.

[Each valid business party 0.5 Marks x 2 = 1]

Business to Consumer – Describes **electronic commercial transaction between business to a Consumer.**

[Each bold point 0.5 Marks x 2 = 1]

Example - Processing an on-line order to purchase a Mobile Phone, Computer, Food (Home delivery of food),

[Each valid business party 0.5 Marks x 2 = 1]

Consumer to Consumer – Describes **electronic commercial transaction between consumers.**

[Each bold point 0.5 Marks x 2 = 1]

Note : Transactions are generally performed through a facilitator e.g. Amazon.com, Craigslist.com, eBay.com or through a collaborative facilitation among consumers. e.g. e-commerce web portal for university students.

Example – Processing an on-line transaction to purchase a text book by one consumer from another consumer. (The latter is also a member of the same community)

[Each valid business party 0.5 Marks x 2 = 1]

(ii) B2E Most appropriate tool - email **[1 Mark]**

Justification :

- Simple and easy to use,
- Easy to obtain.
- Easy to access from low-end electronic devices.
- Each individual can have his/her own email address,
- Delivery of messages guaranteed,
- Privacy/Security assured,
- Different email groups can be formed among the entire community to communicate at different levels,
- a tool like webmail can provide wider access facility,
- Each individual can communicate with his/her peer groups independently.

[1 Mark for each valid justification up to 2 = 2 Marks]

(b) (i) Agent - A software agent is a **computer program** which works **autonomously** towards goals in a **dynamic environment** on **behalf of another entity** over extended period of time,

[0.5 marks for each characteristic * 4 = 2 Marks]

(ii) Characteristics

- Autonomous
- Intelligent
- Performs in dynamic environments
- Able to interact with massively increasing information
- Self-governed. i.e. No direct supervision or control required,
- Flexible to a significant degree
- Interacts with other agents competitively or collaboratively
- Works over extended period of time
- Creative (to transform goals into active tasks)
- Community – predefined or open-ended

[1 mark for each correct answer up to 2 = 2 marks]

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