IJC Prelim 2 Paper 2 Solution

1 a) i) switch: [2]

- forward messages between the computers attached to it
- Connect multiple LAN segments
- could be used to make bus network more reliable by attaching clients directly to it using their own dedicated cable and attaching switch to bus network (star like

ii) router: [2]

- forwards packets from one network to another;
- used to route data traffic between the LAN and the Internet.

iii) bridge: [2]

- Bridges filter network traffic (keep local traffic local) based on MAC addresses.
- Could be used to segment a bus network into two segments so that there is better performance/fewer collisions Connect two or more LAN segments.
- Have the intelligence to pass traffic from one segment to another *only when that traffic is destined for the other segment* A segment is a run of cable to which are attached a number of workstations

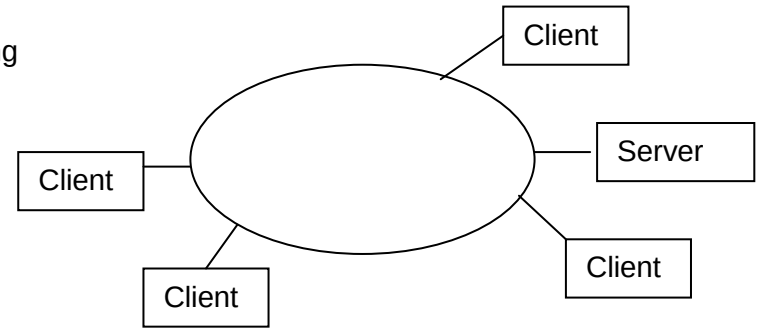
b) i) [2]

- LAN is restricted to a small geographic area. WAN is as dispersed as necessary
- LAN can be hard wired WAN requires some other type of communication medium
- LAN can be served by digital information/WAN often needs information type to be altered
- LAN is secure because it can be easily controlled/WAN is more difficult to control

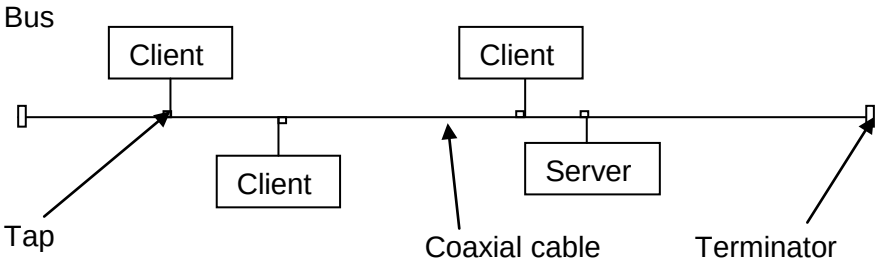
Any two •

ii) [6]

Ring



Bus

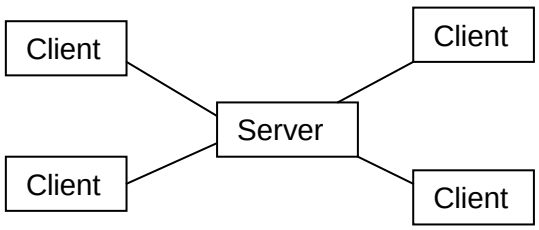


Topology diagram showing:

- terminators;
- workstations/nodes(clients) spread along cable;
- server.

- A bus topology connects each station to a coaxial cable, that is called the bus.
- Workstations/nodes spread along cable
- A tap is used to connect a station to the bus.
- A terminator is required at each end to absorb the signal so that it is not reflected across the bus.

Star



c) Intranet is define as an organization's private, secured computer network system that uses the same concepts, technologies and protocols (standards) as The Internet, but operates on a Local Area computer Network (LAN). It incorporates a working, interactive custom environment to serve the business/organization model, with familiar Internet website-like navigation and functionality. [1] [3]

- Sharing of information and resources (files, documents et)
- Monitoring of employees,
- Conferencing,

Any valid uses max [2]

2	a)	physical security - ie make sure the doors to computer rooms are properly locked. passwords - make sure that data can only be accessed by entering a correct password. encryption - coding the data to make it meaningless to thiefs.	[3]
	b)	Backups of all current data should be made.	[1]
	c)	• company will need to ensure that all data is only used for the purpose for which is was registered. • company will need to make sure that data is secure. • company will need to make sure that data is kept up-to-date.	[3]
	d)	• There may be a concern that workers will get eye-strain or back/neck strain from sitting at the computers all day. • Ergonomics - there must be proper seating and lighting provided.	[2]
	e)	• staff will be afraid that computers will replace them (Loss of job). Assurance need to be given that computers will enhanced the job. • No confident to handle computer. Staff will be given trainings to overcome the problem. • Some, probably older, workers unable to retrain will be deployed to other areas of work. [2] per • max [4]	[4]

3 a) i) [4]

Passed dimension tests	Y	Y	Y	Y	N	N	N	N
Passed strength tests	Y	Y	N	N	Y	N	Y	N
Passed paint tests	Y	N	Y	N	Y	Y	N	N
Accept	X							
Repair		X	X					
Reject				X	X	X	X	X

ii) [4]

Passed dimension tests	Y	Y	Y	Y	N
Passed strength tests	Y	Y	N	N	-
Passed paint tests	Y	N	Y	N	-
Accept	X				
Repair		X	X		
Reject				X	X

b)
```
WHILE CONTROL SYSTEM ON DO
   WHILE M NOT TRIGGERED DO
      IF AIR-CON ON THEN
         AIR-CON OFF
      ENDIF
   ENDWHILE
   IF T>D THEN
     IF  AIR-CON OFF THEN
        AIR-CON ON
     ENDIF
   ELSE
     IF AIR-CON ON THEN
        AIR-CON OFF
     ENDIF
  ENDIF
ENDWHILE
```
[6]

- Loop for system switched on
- Loop to wait for M to be triggered
- Switch off Air-Con in loop
- Condition statement re: temperature
- Two correct outcomes: Air-Con on Air-Con off
- Condition to reverse current state of Air-Con

(1 per •, max 6)

c) i)
- People may be in the way
- Items may be put down on what should be an empty part of the floor
- Workers may change the position of 'fixed' items like chairs, benches

(1 per •, max 2) [2]

c ii)
- Sensor to detect objects in path
- Sensor on wheels to count revolutions to decide how far moved
- Alarm signals sound/light, activated when obstruction sensed
- Light flashes when powered battery low.
- Control of motors on wheels to move at safe speed/ in right direction

(1 per •, max 4) [4]

4 a) Barcode [6]
- consists of pairs of dark lines
- of varying thickness which combine to give a (character) code
- Used to identify worker

OCR
- is a means of computer reading standard characters
- comparing the values with examples in memory
- Light reflected off character
- determines shape by reading intensity reflected in small squares (fewer characters the better)
- Used for reading times/signatures.
- Different days signified by different positions of data on the card

(1 per •, max 3 for each, max 6)

b) i)
- Records are stored in a logical order of key field (in this case most probably in order of employee number [1]

- All the records have to be updated
- Necessary to compare each record with its entry in a transaction file
- Which will also be in order
- No apparent need for direct access to records

(1 per •, max 2) [3]

ii) [4]
- The times that the workers come and go are collected as a batch
- Processing cannot be started until all the data is collected
- Large amounts of data
- Data is all very similar
- needing similar processing
- processing is simple
- Once processing starts no human intervention is necessary
- Results are not time sensitive
- Pay must be calculated for all workers

(1 per •, max 4)

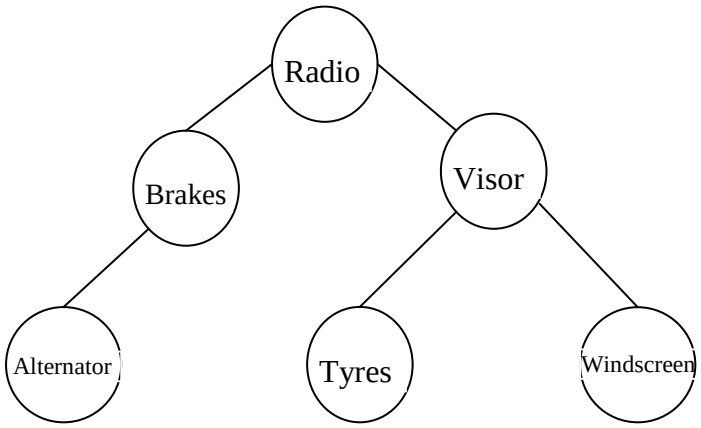
c) i) [4]
Backing up is making a copy of the current file so as to guard against data loss (corruption from accidents or deliberate action such as accidental deletion of the file, when the current file is changed or updated, the backup file is updated as well, so that it is always identical as the current data file

Archiving on the other hand is the removing of a file(or records) from online storage and kept on a long term storage medium such as disk or magnetic tape for future reference (information sake and record keeping) if necessary.

ii) [3]
- Regularly
- copy of files/to portable medium
- More than one copy made
- at least one copy kept off site
- Transaction log kept between back-ups

(1 per •, max 4)

5 a) Radio, Visor, Brakes, Tyres, Alternator, Windscreen [3]



b) Begin [5]

```
 READ VALUE NEW_PART
 START AT ROOT NODE
 WHILE NODE NOT EMPTY, DO
    IF NEW_PART < VALUE AT NODE THEN
         FOLLOW LEFT SUBTREE
    ELSE
         FOLLOW RIGHT SUBTREE
    ENDIF
 ENDWHILE
 INSERT NEW_PART AT NODE
END
```

OR

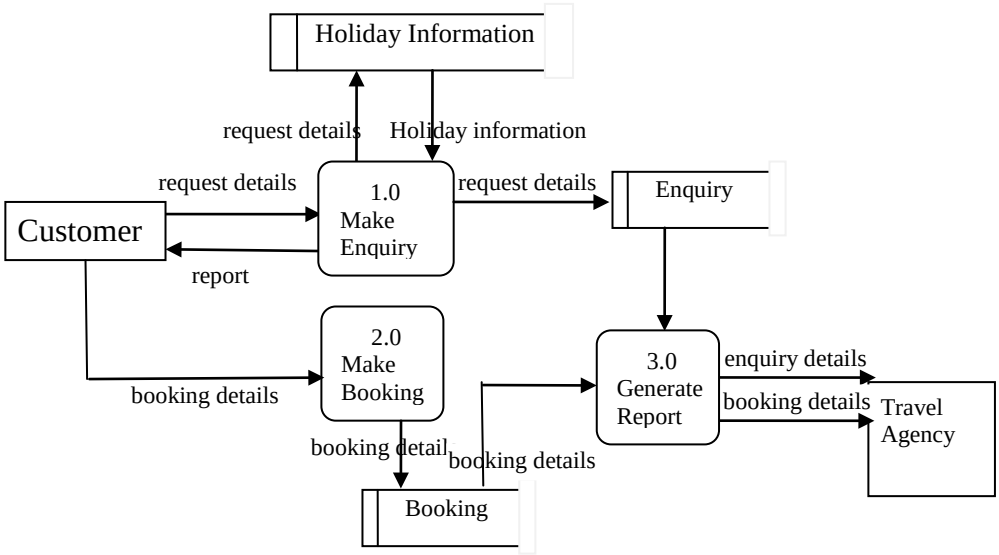
```
if root is null     // empty tree
     New nodeptr    //  get new node with nodeptr pointing to it
     root = nodeptr
     root->info=name
     root->leftlink=null
     root->rightlink=null
Else
{
     current=root
     While(current is not null)
     {
         If(current->info>=name)
               current = current->leftlink   //Follow the leftlink of current
         Else
                current = current->rightlink    //Follow the rightlink of current
     }
     New nodeptr  // get new node with nodeptr pointing to it
     current= nodeptr
     current->info=name
     current->leftlink=null
     current ->rightlink=null
}
```

c) Traverse left subtree [3]
Read/output the root
Traverse right subtree

d) node[ ], llink[ ], rlink[ ]
one array node[ ] with the names and two other arrays llink[] and rlink[] [5]
containing the left and right pointer values.
As an array can only contain one type of data and the pointers are integers then the null value have been represented with a value such as -1.

	llink	node	rlink
1	3	Radio	2
2	4	Visor	6
3	5	Brakes	-1
4	-1	Tyres	-1
5	-1	Alternator	-1
6	-1	Windscreen	-1

6 a) [6]



b) i) Hardware features:
- needs to be robust and not easily damaged. [5]
- may have touch-sensitive screen for selections.

Software features:
- should be easy to use for non-experts,
- probably involves a GUI
- should make attractive use of colour, animation etc.
- should be difficult to 'crash'

ii) advantage [2]
- There is less 'pressure' from staff to make decisions - they can spend as long as they like.
- Save time. Do not have to wait to be served.

disadvantage
- The customer may lack the necessary IT skills and able to access the information.
- Only standard information is displayed and may not tailor to all customers.

iii) [2]
- count the number of times customers have used the system and the number of bookings they have made.
- interview customers to ask their opinions.