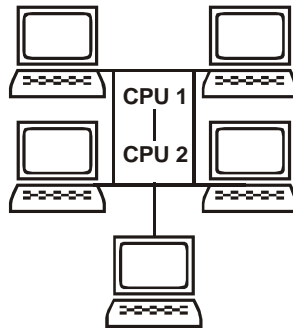*Disclaimer Clause :* *These solutions are prepared by expert faculty team of Resonance. Views and answers provided may differ from that would be given by ICAI due to difference in assumptions taken in support of the answers. In such case answers as provided by ICAI will be deemed as final.*

1.   **(i) Multi-Processing:**

(a)   Multi-Processing is a system, which features **more than one** Central Processing Unit.

(b)   This system consists of two complete computers, the smaller computer has an Operating System and controls both the machines.

(c)   The larger computer is a **slave to the smaller machine.** The small computer processes all input and schedules and prints all output, using disks as a temporary storage area.

(ii) Virtual Memory:

(a)   Under a Virtual Memory, a program and its data are broken into **pages.**

(b)   Only those pages needed in primary memory at any one time are loaded, other pages are kept on secondary—storage devices.

(c)   In a **demand—paging** scheme, a program executes in memory until it needs a page-that is not in primary memory.

(d)   This entire process is transparent to the Programmer, who views a virtual memory as large as the total number of pages allowed, not the physical size of the computer's memory.

(es) The disadvantage of virtual memory systems is that time is lost when **page-swapping** occurs.

(iii) Metadata , or **data about data,** is used to inform Operators and Users of the Data Warehouse,about its status and the information held within the Data Warehouse.

(iv) Semantics: protocol normally defines three aspects for data communication
   (a) Syntax   (b) Semantics   (c)   Timing.
     Semantics: define order of message used to ensure reliable and error free info transfer.

(v) partitioned database : each location maintain its own database and resources but at the same time one common place like head office all the shareable data elements are also maintained. All locations database are connected with this common database to access the data of other locations to provide services from any location. This is a popular technique of creating distributed database. Banks etc. uses this technique for creating distributed databases.

(vi) Multimedia Network: A Communications Network that transmits data, voice, image, video, etc.

(vii) Middleware:
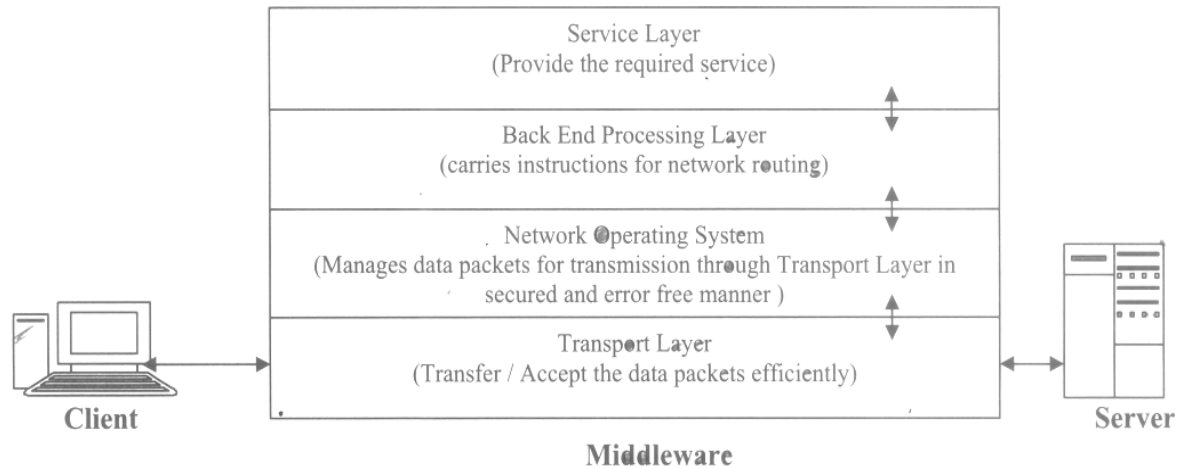
Middleware is term used in three-tier architecture. It is a network system which allows client and server to interact with each others. Middleware allows to implements an efficient distributed network system. In general, a middleware provides services like directory service, queuing, distributed file sharing, etc. A typical middleware provides four layers which execute different type of tasks.

(viii) Repeater :
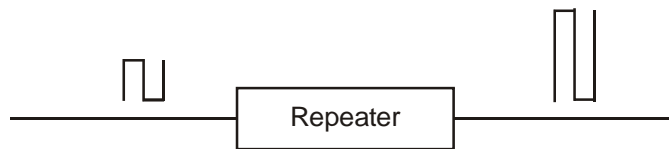
(a) Repeater is a device, which simply repeats the incoming single for outgoing communication on channel but with increased strength.

(b) Repeater is also known as amplifier, it amplify the incoming signal for long distance communication.

(ix)   **Extranet** Extranet is a private network that uses the internet protocol and the public telecommunications system to other businesses.

Extranet is an extension of intranet which makes organization intranet to be accessible to outside world also, like to the customers and business associates. In case of extranet the part of intranet made available to customers or business associates for specific business applications. Extranet is also known as virtual corporation established by providing connection of specific parts of intranet to business partners (material suppliers financial partners, buyers etc) for effective e-commerce.

(x)   **A Uniform Resource Locator (URL)** is a specification of URI that defines the network location of a specific resource ie.. it resembles to a person's street address. It is used to address and access iindividual Web pages and Internet resources. The format of a URL is: proto col/Internet address/ Web page address.
For example - http://www.icai.org/seminars.html

2.   **(a) Basic functions of operating system**
(i) Schedule Jobs: OS gives priorities to different work based on User needs, and can determine the sequence in which they the job needs to be managed.
(ii) Manage Hardware and Software Resources: The programs required by the User gets loaded in the primary storage, and then cause the various hardware units to perform as specified by the program.
(iii) Maintain System Security: A Password is created for every User, to ensure that unauthorized persons are denied access to data and system.

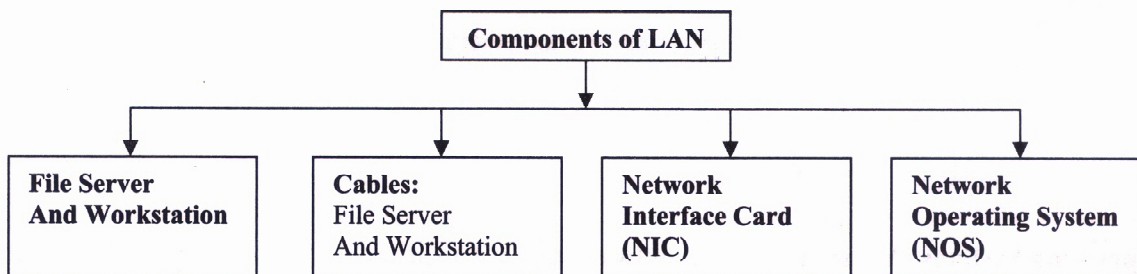**(iv) Enable Multiple User Resource Sharing:** Many Users can share the programs at the same time.

(b) (i) $(10101.001)_2 = ( )_{10}$

$= (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) + (0 \times 2^{-1}) + (0 \times 2^{-2}) + (1 \times 2^{-3})$

$= 16 + 0 + 4 + 0 + 1 + 0 + 0 + \dfrac{1}{8}$

$= 21 + \dfrac{1}{8}$

$= (21.125)_{10}$

(ii) $(55 .25)_{10} = ( )_2$

2	55	R
2	27	1
2	13	1
2	6	0
2	3	0
	1	1

	Integer
$0.25 \times 2 = 0.50$	0
$0.50 \times 2 = 1.00$	1

$(110011.01)_2$

3. **(a) Components of Local Area Network (LAN) :**

(1) **Server or File Server:** Server is a computer which is used for managing the files and devices of a network. Server also helps in handling network communication and servicing the various requests of users for information sharing on a network. Server can be dedicated or non-dedicated; in dedicated server, all the network management functions are done by server and in case of -non-dedicated server some of the management functions are transferred to workstations.

Workstation: Workstations are standalone computers which act as nodes in the network and attached to server using network interface card. Workstations are normally personal computers with their own processing power, and because these are connected on network therefore use the extra processing power and capabilities of server that makes them more capable than standalone personal computers. Generally a workstation is defined as: LAN. Card + PC = Workstation

(2) **Cables:** Cable is used for connecting computers and devices on network. Cable is communication channel of network on which data communication takes place. The popular types of cables are UTP (unshielded twisted pair) cable, coaxial cable and optical fiber cable.

UTP or STP Cable: This is most popular type of cable for creating LAN. This cable is used with HUB or SWITCHE to build a LAN. It is like a telephone receiver cable. It provides speed of transmission normally from 10Mbps to 100 Mbps

Coaxial Cable: This was the most popular type of cable for setting-up a LAN before the popularity of UTP cable. It is like a TV cable and provides data transmission speed of approximately 10 Mbps

Fiber Optical Cable: This is the latest cable technology and used for building high speed LAN, known as Giga Bits LAN. This type of cable provides the highest data transmission speed.

(3) Network Interface Card: Every device connected to a LAN needs a communication device known as Network Interface Card (NIC). This card is normally known as Ethernet card because this card uses Ethernet protocol for data communication. NIC is used in every PC connected in network mode. NIC uses various rules and regulations i.e. protocol (normally known as Ethernet protocol) for smooth and error free communication of data.

(4) Network Operating Systems (NOS): This is the software which is loaded onto the server hard disk. The job of this software is to manage and control the working of network. It is, in fact, NOS which helps to make a computer as a server on a network. The NOS helps in file management, security management, applications management, users management, processing management and devices management functions of a Network.

(b) Mesh Network Topology :
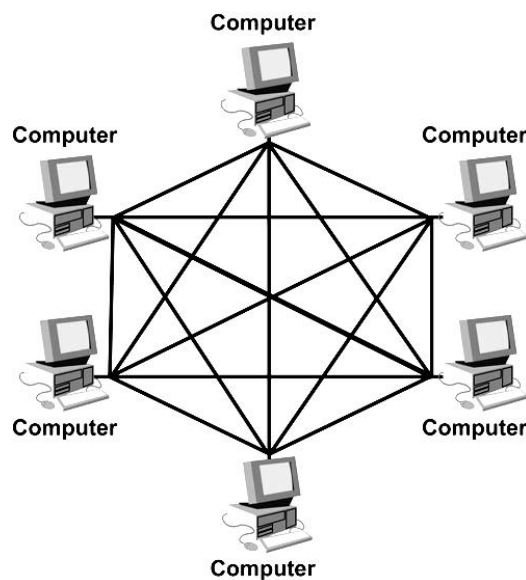
1.   **Meaning:**
      (a) In a Mesh Network Structure, the nodes are randomly connected using communication links.
      (b) It may be fully connected or connected with only partial links.
      (c) In a fully inter-connected topology, each node is connected by a dedicated point-to-point link to every node.
      (d) In partially inter-connected topology, the computer nodes are widely scattered.

2. Advantages
      (a) The reliability is very high since there exists an alternate path if the direct link between two node is down.
      (b) Provide point to point comunication or direct comunication.
      (c) Yields greatest amount of redundancy in the event that one of the node becomes fails.
      (d) Provide routing of data through alternate path if direct path is busy or not working.

4.   **(a)   The following factors should be considered in determining the appropriate method of File Organization -**

1.   **File Volatility:** File Volatility is the number of additions and deletions to the file in a given period of time. For example, Payroll File of a Company where the Employee Register is constantly changing is a highly volatile file, and therefore direct access methods are better.

2.   **File Activity:** File Activity refers to the proportion of records accessed on a run to the number of records in a file. In case of real-time files where each transaction is processed immediately and only one master record is accessed at a time, Direct Access Method is appropriate. In case where almost every record is accessed for processing, a sequentially ordered file is appropriate.

3. **File Interrogation:** File Interrogation refers to the retrieval of information from a file. If the retrieval of indi vidual records must be fast to support a real-time operation, (e.g. airline reservation), then direct organization is required. If, on the other hand, requirements for data can be delayed, then all the individual requests or information can be batched and run in a single processing run with a sequential file organization.

4. **File Size: L**arge files which require many individual references to records with immediate response must be organized under Direct Access Method. In case of small files, it is better to search the entire file sequentially or, with a more efficient binary search, to find an individual record than to maintain complex index or complex direct addressing scheme.

(b) **Difference between Internet and WWW:** The Internet & the World Wide Web (the Web), though used interchangeably, are not synonymous. Internet is the hardware part - it is a collection of computer networks connected through either copper wires, fiber optic cables or wireless connections whereas, the World Wide Web can be termed as the software part — it is a collection of web pages connected through hyperlinks and URLs. In short, the World Wide Web is one of the services provided by the Internet. Other services over the Internet include e-mail, chat and file transfer services. Table highlights some of the major differences between Internet and WWW.

	Internet	**WWW**
Nature	Hardware	Software
Comprises of	Network of Computers, copper wires, fiber - optic cables & wireless networks	Files, folders & documents stored in various computers
Governed By	Internet Protocol	Hyper Text Transfer Protocol
Dependency	This is the base platform and is independent of WWW	It depends on the Internet to work

5.   **(a) Mobile Commerce (M–Commerce) Technology**

1. Meaning:
(a) It is the buying and selling of goods and services through wireless handheld devices such as Cellular Telephone and Personal Digital Assistants PDAs.
(b) Mobile Commerce deals about the explosion of applications and, services that are becoming accessible from Internet-enabled mobile devices.
(c) It is also known as **next-generation e-commerce.**
(d) It involves new technologies, services and business models
(e) It enables users to access the Internet without needing to find a place to plug in.

2. **The business areas affected by M–commerce includes :**
   • **Financial seriveces,** which includes mobile banking (when customers use their handled devices to access their accounts and pay their bills) as well as brokerage services, in which stock quotes can be displayed and trading conducted from the same handled device.
   • **Telecommunications,** in which service changes, bill payment and account reviews can all be con ducted from the same handled device.
   • **Service/retail,** as consumers are given the ability to place and pay for orders on-the-fly.
   • **Information services,** which include the delivery of financial news, sports figures and traffic updates to a single mobile device.
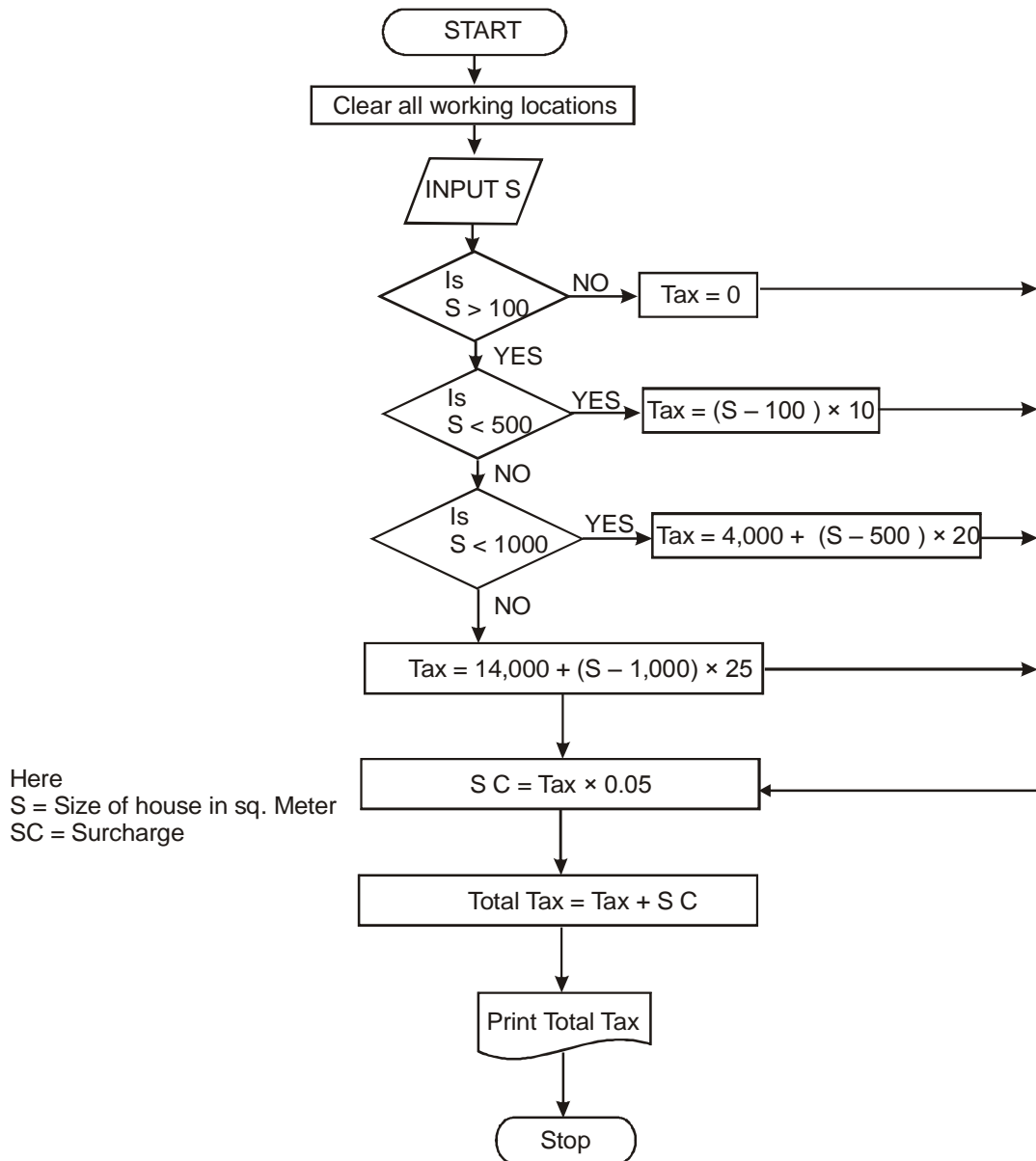
6.   **(a) Difference between condition stub and conditon enteries :**

        Condition Stub : It lists out the conditions or comparison that could exists in a program. It reflect the possible states of input data to be tested in a program.

        Condition Entries:
- They indicate which conditions are being met or answer the questions in the condition stub.
- The describe which factors are actually components of a decision.

    (b)

START

Clear all working locations

INPUT S

Is S > 100 — NO → Tax = 0

YES

Is S < 500 — YES → Tax = (S – 100) × 10

NO

Is S < 1000 — YES → Tax = 4,000 + (S – 500) × 20

NO

Tax = 14,000 + (S – 1,000) × 25

Here
S = Size of house in sq. Meter
SC = Surcharge

S C = Tax × 0.05

Total Tax = Tax + S C

Print Total Tax

Stop

7.   **(i) Spooling Software :**
- Spooling **(Simultaneous Peripheral Operation On Line)** is a technique used for dynamic job processing.
- It allows input and output operations to occur simultaneously with processing operations.
- Input data from low—speed devices is stored temporarily on high speed secondary storage units to form a queue, which can be quickly accessed by the CPU.
- Output data is also written at high speed onto tape or disk units and forms another queue waiting to use slow—speed devices such as a Printer. The jobs are transferred to these output devices when

these devices are available.

- The Operating System supplies a special written program to control the spooling process. Hence, with aid of spooling technique, the CPU does not have to wait for the slow input/output devices, and hence, it can work at its maximum speed.

(ii) Program Debugging : During the process of compilation or interpretation there can be many errors which should be removed from the source code. This process of removal of errors from the source code or source program is knows as compilation of program that is conversion of source code into object code. Other is known as run time error which occurs while running correctly compiled program. The removing or debugging the error which occurs while running correctly compiled program. The removing or debugging the errors which occur at compile time is much easier than the removing and debugging the errors which occurs at run time.

(iii) (ii) Host-based Intrusion Detection (HID): Host-based intrusion Detection Systems are designed to monitor, detect, and respond to user and system activity and attacks on a given host. Some more robust tools also offer audit policy management and centralization, supply data forensics, statistical analysis and evidentiary support, and in certain instances provide some measure of access control. The difference between host-based and network-based intrusion detection is that NID deals with data transmitted from host to host while HID is concerned with what occurs on the hosts themselves. Host-based intrusion detection is best suited to combat internal threats because of its ability to monitor and respond to specific user actions and file assesses on the host. The majority of computer threats come from within organization, from many different sources; disgruntled employees and corporate spies are just two examples.

(iv) Honeypot: In fully deployed IDS, some administrators may choose to install a "Honeypots", essentially a system components setup as bait or decoy for intruders. Honeypots can be used as early warning system on a attack, decoys from critical systems, and data collections sources for attack analysis. A honeypot should only be deployed when the organization has the resources to maintain it. Many IDS vendors maintain honeypots for research purposes and to develop new intrusion signatures. A honeypot left unmanaged may become a significant liability because attackers may use a compromised honeypot to attack other systems.

(iv) Electronic Purses.
    (a) Electronic Purses is a way to make payments over the net, and is very similar to a Pre–Paid Card.
    (b) Example: Bank issues a Stored Value Cards to its Customers, the Customer can then transfer value from their accounts to the Cards at an ATM, a Personal Computer, or a specially equipped telephone.
    (c) The Electronic Purse Card can be used as an ATM Card as well as a Credit Card.
    (d) While making purchases, Customers pass their Cards through a Vendor's Point Of Sale Terminal. No credit check or signature is nedeed.
    (e) Validation is done through a Personal Identification Number (PIN).
    (f) Once the transaction is complete, funds are deducted directly from the Cards and transferred to the Vendor's Account.
    (g) Merchants can transfer the value of accumulated transactions to their bank accounts by telephone, as frequently as they choose.
    (h) When the value on a Card is spent, consumers can load additional funds from their accounts to the card.