Q1	**Situation Action Versus Planned Action Models** There are two basic approaches to task design: planned actions that include re-planning, and situated actions (Suchman, 1987, pp. 49–67). In planned actions, user activities are driven by specifying user objectives or goals and plans to achieve that goal (pre-planning), e.g., HTA . Monitoring and awareness of the situation during the plan execution can provide feedback or constraints to possibly modify the plans and make them more resilient. This approach assumes that the user is able to define a goal, that preset plans to achieve the goal can be designed in advance and that contingency plans to adapt to any significant changes can be specified in advance. An alternative approach is to set a goal but not to predefine a plan to achieve that goal but merely to assess locally at each stage what is the best choice of action that moves closer to the goal, situated actions, e.g., to assess at each step what the optimum next local action is, that brings the user nearer to achieving his or her goal. In addition, feedback on the status of the activity needs to reach the user so that the user can then choose to influence any reconfiguration of the activities, Riva (2005) specifies two main approaches to model situated actions. The first approach, a situated-cognitive approach builds symbolic models of relations between subjects and the properties of specific environments (affordances and constraints). This does not explain how the choice of possible actions is constrained other than by the situation itself. In addition, the social space influences the activities of the subject. The second approach, an interactional approach such as Wenger's community of practice, says that these develop through joint enterprise as understood and continually negotiated by its members, that these operate though mutual engagement that binds members together into a social entity and that they use a shared repository of communal resources including vocabulary and policies. A key concern is how a user retains the control of his or her planned activities and perhaps can influence the effect of a detected situation or a changed situation. This can be modelled by a theory of presence that seeks to differentiate between internal and external states and that to experience distal attribution, perceiving an external space outside our boundaries (Riva, 2005).
Q2	**User context awareness properties** Users' physical characteristics and capabilities for HCI e.g., how easy they find interacting with a particular type of UI such as a pointing device • User presence in a locality or some detected activity within some application context. • User identity . • User planned tasks and goals . • Users' activity situated tasks, which may be spontaneous and unplanned, may be concurrent, may involve composite tasks and may be spread across multiple device • User emotional state , e.g., repeatedly, pressing a key may indicate impatience.
Q3	**Affective Computing** One important human trait used in human–human interaction is the ability to recognise,

	interpret, process and share human emotions. In 1995, Picard at MIT proposed the idea of affective computing that relates to, arises from, or influences emotions. Affective computing applications included computer-assisted learning, perceptual information retrieval, arts and entertainment, and human health and interaction. Emotional responses make a core contribution to human behaviour. The design challenges for affective computing overlap to some extent the design issues for determining the user context and those for developing more complex human-like intelligence models for use in UbiCom Systems. In addition, models of human intelligence (Russell and Norvig, 2003) are a core model for building artificial intelligence along with rational intelligence models. Picard has reviewed some of the main design challenges for this paradigm and identified six design challenges (Picard, 2003): The range of means and modalities of emotion expression is very broad: many of these modalities may be inaccessible (e.g., blood chemistry, brain activity, neurotransmitters), and many others cannot be differentiated. • People's expression of emotion is so idiosyncratic and variable: accurately recognising an indivi-dual's emotional state from the available data is challenging. However, emotions can be more accurately classified if they are determined over time and if they are correlated to other factors such as time of day. • Cognitive models for human emotions are incomplete (little real progress has been made with cognitive modelling). Existing models of emotion often use highly stylised stereotypes of person-ality types and emotional responsiveness, which do not correspond to real behaviour in real people. The role of situational factors in emotion expression is poorly understood. • The sine qua non of emotion expression is the physical body but computers are not embodied in the same way. Hence because computers are not embodied, they cannot reliably and believably express emotion. Computers can express emotions without having physical bodies as seen insome film and animation characters. Note also that people with varying degrees of physical disabilities can also express emotions in a range of ways with even very limited modalities. • Emotions are ultimately personal and private: they provide information about the most intimate motivational factors and reactions. Attempts to detect, recognise, and manipulate a user's emotions can invade user privacy. However, humans often attempt to manipulate the emotions of other humans and this is not considered unethical. • There is no need to contaminate purely logical computers with emotional reactiveness. However, several studies have supported vital roles for emotion in many background processes: percep- tion, decision-making, creativity, empathic understanding, memory, as well as in social interaction (Picard, 2003).
Q 4	**Explain iHCI System Properties.**
	The original UbiCom vision focused on making computation and digital information access more seamless and less obtrusive. To achieve this requires in part that systems do not need users to explicitly specify each detail of an interaction to complete a task. For example, using many electronic devices for the first time requires users to explicitly

	configure some proprietary controls of a timer interface. It should be implicit that if devices use absolute times for scheduling actions, then the first time the device is used, the time should be set. This type of implied computer interaction is referred to as implicit human–computer interaction (iHCI). Schmidt (2000) defines iHCI as 'an action, performed by the user that is not primarily aimed to interact with a computerized system but which such a system understands as input'. Reducing the degree of explicit interaction with computers requires striking a careful balance between several factors. It requires users to become comfortable with giving up increasing control to automated systems that further intrude into their lives, perhaps without the user being aware of it. It requires systems to be able to reliably and accurately detect the user and usage context and to be able to adapt their operation accordingly.
	Compare Smart Device, smart environment, smart Interaction.
	Smart Environment: The concept of smart environments evolves from the definition of ubiquitous computing that, according to Mark Weiser, promotes the ideas of "a physical world that is richly and invisibly interwoven with sensors, actuators, displays, and computational elements, embedded seamlessly in the everyday objects of our lives, and connected through a continuous network. Smart environments are envisioned as the by product of pervasive computing and the availability of cheap computing power, making human interaction with the system a pleasant experience. Smart Device: A smart device is an electronic device, generally connected to other devices or networks via different wireless protocols such as Bluetooth, NFC, Wi-Fi, LiFi, 3G, etc., that can operate to some extent interactively and autonomously. Several notable types of smart devices are smart phones, smart cars, smart thermostats, smart doorbells, smart locks, smart refrigerators, phablets and tablets, smart watches, smart bands, smart key chains, smart speakers and others. The term can also refer to a device that exhibits some properties of ubiquitous computing, including—although not necessarily—artificial intelligence. Smart devices can be designed to support a variety of form factors, a range of properties pertaining to ubiquitous computing and to be used in three main system environments: physical world, human-centred environments and distributed computing environments. Smart interaction: Screen-Smart Device Interaction (SSI) is fairly new technology developed as a sub-branch of Digital Signage. It differs from the Second screen configuration. The latter typically has the first screen being a big screen and the second screen being the smaller screen of a cell phone.

	Where the small screen cannot affect or control the big screen. The small screen is often used to provide supplementary data on the content of the big screen. In contrast, SSI is distinguished by the small screen being able to change the flow of information or content on the big screen. The big screen shows an identifier of its computer network address. Often, the network is the Internet. The identifier might be in a barcode that is part of the image on the big screen. The mobile device scans the barcode, decodes it and queries a server. The server controls the big screen. When the server gets the query, it extracts the identifier of the big screen. The server can alter the mobile device screen and the big screen in a feedback loop. The user of the mobile device can pick buttons in its web page to change the big screen. The mobile device functions as a remote control. The advantage is the decoupling of specific hardware requirements for the pair of the mobile device and the big screen. If the mobile device is a cellphone, it only needs a camera and wireless Internet access.
Q 5	**Explain characteristics of ICT devices?** Four of the most commonly used networked ICT devices are the personal computer in its various forms such as desktop and laptop, hand held mobile devices used for communication, games consoles and remote controlled AV displays, players and recorders. The term computer in the acronym HCI has a much more diverse meaning within the field of UbiCom. It refers to any device with a programmable IC chip inside, including a range of multitask operating system (MTOS) devices. Common multi task devices include desktop and laptops PCs, mobile phones, games consoles, AV recorders and players such as televisions, radios and cameras. Each of these supports keypad or keyboard haptic inputs and audio outputs and output display interfaces. The user interfaces for these devices are primarily visual. Note the design for a universal visual interface interaction model will not work equally effectively across the wide variety of display and input device types and sizes. There are several dimensions devices could be characterised according to: 1. size: hand sized, centimetre sized, decimetre sized versus micro sized versus body sized or larger; 2. Haptic input: two handed versus one handed versus hands free operation; 3. Interaction modalities: single versus multiple; 4. Single user versus shared interaction: in personal space, friends' space or public space 5. Posture for human operator: lying, sitting, standing, walking, running, etc.; 6. Distance of output display to input control: centimetres to metres; 7. Position during operation: fixed versus mobile; 8. connectivity: stand alone versus networked, wired versus wireless; 9. tasking: single task devices versus multi task devices; 10. multimedia content access: voice and text communication oriented, alpha numeric data or text oriented, AV content access; 11. integrated: embedded integrated devices versus dynamically interoperable devices.
Q 6	**Explain WIMPS interface,MEMEX?** PC style WIMPS interaction will not work as effectively on mobile devices because the display area is smaller. It is impractical to have several windows open at a time. It can be difficult to locate windows and icons if they are deeply stacked one on another and to resize them. Screen navigation using fingers on a touch pad or an external device may be too big and unwieldy for small devices. In addition, the keyboard is smaller for user input and there is a greater variety of input devices. Instead of using the inbuilt device interface, the device can be attached to different kinds of external input interface which are available in the environment. It could become common to

	have displays, keyboards and Internet work connections at fixed hotspots and to allow users to plug in their own mobile access device. Single hand held mobile devices such as PDAs and smart phones have used a variety of types of interfaces to overcome their resource constrained input and output devices (Jones and Marsden, 2006) .
Q7	**Explain personal computer interfaces?** Although Windows systems were demonstrated as early as 1965, the basic idea was envisaged as early in 1945 by Bush (1945) in his MEMEX system: 'It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers. Otherwise it looks like an ordinary desk.' Section 13.6 reviews the changes in UIs and considers UIs in the future. From the early 1980s, computers started to become more widely used by non specialist users. The keyboard and visual command interface which allowed text to be entered and displayed one line at a time dominated computer interfaces. Users needed to be able to remember the command name and the syntax of any parameters used to qualify the command such as data files for the command to act on. The command is executed when a delimiting character such as the return key is typed. Commands within an application can only be issued sequentially. It is a quite an efficient interface when the same command needs to be repeated, using a loop, on different data sets. From the early 1990s, the WIMPS interface which supports direct manipulation of visual objects prevailed. Users can interact with computers by typing text commands but for many tasks direct interaction can be used by activating and moving active window sub areas called icons and menus, using mouse clicks and mouse drag and drop respectively. Such an interface is commonly called WIMPS (Windows, Icons, Menu and Pointer device) and direct manipulation. It is the dominant interface for desktop and laptop computers at this time. The mouse as a pointer device was first demonstrated in 1965 as a replacement for the light pen. Dialogues are mechanisms in which users are informed about pertinent information that they must acknowledge receipt of or they ask for input to constrain a query. Typically, this type of interface is displayed in the form of a pop up window called a dialog box. Query dialogues may also use a language that requires a specific syntax to constrain the queries, e.g., the SQL relational database query language. Form filling dialog interfaces are used by many applications for alpha numeric data input, e.g., into an information system, or for data output, e.g., a spreadsheet. These enable applications to receive data input in a structured way, reducing the processing used by a computer.
Q 8	**Explain Human-ICT device Interaction in detail.** Human–ICT Device Interaction (HCI) For the interaction between two systems, Humans (H) and ICT systems (C), four characteristic points across the interaction domain are considered, maximum H interaction (H2H or HHI) with minimal C interaction, more H interaction facilitated by C interaction (H2C), more C interaction that leads to human interaction (C2H) and maximum ICT interaction (C2C).

Whereas in H2C, Humans have a model of computers, e.g., H has a mental model of C's tasks and goals in order to interact more effectively with the use of C. With C2H, C also has a partial model of H in order to reduce H's interaction.

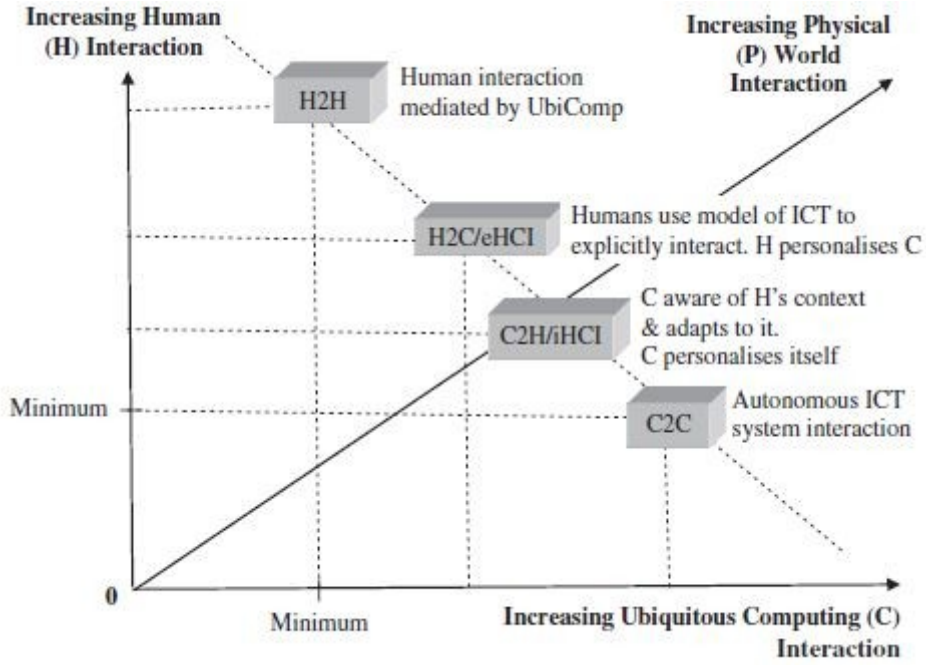


Fig: Human–ICT device interaction (HCI) is divided into four sub-types of interaction H2H, H2C, C2H and C2C.

ICT device to ICT device (C2C), also called distributed computer systems, is the main focus of computer science, telecoms and networks but we take a much wider perspective here. C2C facilitates all the other types of interaction below, e.g., H2H is often mediated by C2C. C2C is often used to automate tasks and is used for pre-processing to filter out unneeded resources or to filter needed resources transparently to the user.

CCI, in turn, depending on how this is defined, interlinks and requires human interaction. Human interaction is required in different parts of the life-cycle of a CCI system.

Explain ICT device-Physical World Interaction.

Ans. Interaction of ICT device with physical world:

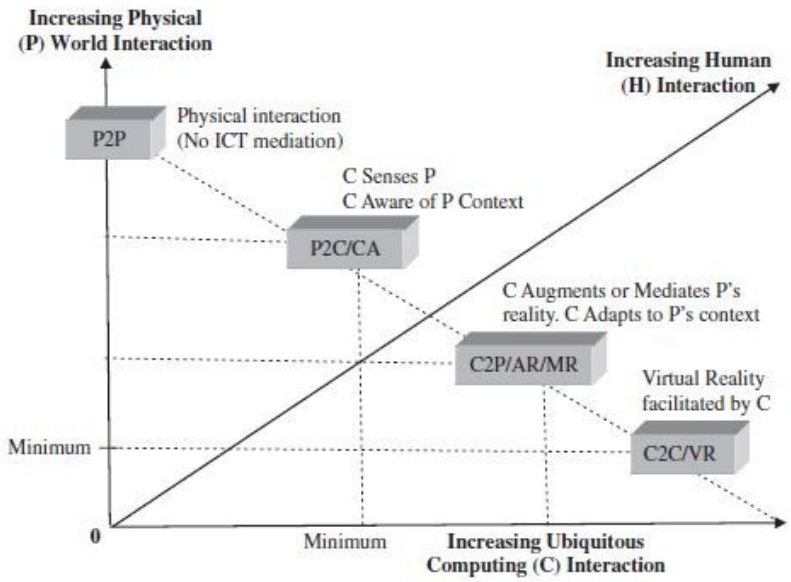


Figure 1.4 ICT device and Physical World Interaction (CPI) is divided into four sub-types of interaction: P2P, P2C, C2P and C2C

Physical World to Physical World Interaction (P2P) refers to interactions within nature that are (as yet) not mediated by any significant ICT system. There are a variety of simple animal life interactions used in nature, in contrast to the more complex human to human interaction. These involve shared chemical scents, visual signage and different types of audio signals such as drumming, buzzing and vocal calls.

Physical Environment to Computer Device Interaction (P2C) covers context-aware ICT systems. These can be designed to be aware of changes in specific physical world phenomena and to react to this in simple ways, e.g., if the temperature is too low, turn up the heating. ICT systems can also be designed to act on the physical world, changing the state of part of the physical world, according to human goals.

Computer Device to Physical Environment Interaction (C2P) refers to augmented and mediated reality systems. ICT systems are used to augment, to add to, physical reality, e.g., physical world views can be annotated with virtual markers.
Computer to Computer Interaction (CCI), the physical world may be used as a conceptual space for virtual interaction. In a virtual reality ICT system, humans can use sensory interfaces such as gloves and goggles to be interfaced to support more natural interaction. Humans may also contain implants for medical conditions that can transmit digital data streams into ICT medical monitoring services.

Q 9 **Explain basic and smart interaction.**

Ans. Basic Interaction:
Basic interaction typically involves two dependent parties: a sender and a receiver. The sender knows the address of the receiver in advance; the structure and meaning of the messages exchanged are agreed in advance, the control of flow, i.e., the sequencing of the individual messages, is known in advance. However, the content, the instances of the message that adhere to the accepted structure and meaning, can vary.
There are two main types of basic interaction, synchronous versus asynchronous :
• Synchronous interaction: the interaction p protocol consists of a flow of control of two messages, a request then a reply or response. The sender sends a request message to the specified receiver and waits for a reply to be received,e.g., a client component makes a request

	to a server component and gets a response. • Asynchronous interaction: The interaction protocol consists of single messages that have no control of flow, a sender sends a message to a receiver without knowing necessarily if the receivers will receive the message or if there will be a subsequent reply, e.g., an error message is generated but it is not clear if the error will be handled leading to a response message. **Smart Interaction:** Interactions that are coordinated, conventions based, semantics and linguistic-based and whose interactions are driven by dynamic organisations are considered to be smart interaction . Hence, smart interaction extends basic interactions as follows: • Coordinated interactions: different components act together to achieve a common goal using explicit communication, e.g., a sender requests a receiver to handle a request to complete a subtask on the sender's behalf and the interaction is synchronised to achieve this. There are different types of coordination such as orchestration (use of a central coordinator) versus choreography (use of a distributed coordinator). • Policy and convention-based interaction: different components act together to achieve a common organisational goal but it is based upon agreed rules or contractual policies without necessarily requiring significant explicit communication protocols between them. This is based upon previously understood rules to define norms and abnormal behaviour and the use of commitments by members of organisations to adhere to policies or norms, e.g., movement of herds or flocks of animals are coordinated based upon rules such as keeping a minimum distance away from each other and moving with the centre of gravity, etc. • Dynamic organisational interaction: organisations are systems which are an arrangement of relationships (interactions) between individuals so that they produce a system with qualities not present at the level of individuals. Rich types of mediations can be used to engage others in organisations to complete tasks. There are many types of organisational interactional protocol such as auctions, brokers, contract-nets, subscriptions, etc. • Semantic and linguistic interactions: communication, interoperability (shared definitions about the use of the communication) and coordination are enhanced if the components concerned share common meanings of the terms exchanged and share a common language to express basic structures for the semantic terms exchanged.
Q10	**Explain keyinputlikeMultiTap,T9,Fasttap,softkeys,auditory interfaces ?** **MultiTap:** The alphabet is printed under each key (beginning on "2") in a three-letter sequence as follows; ABC under 2 key, DEF under 3 key, etc. Exceptions are the "7" key, which adds a letter ("PQRS"), and the "9" key which includes "Z". Punctuation is typically accessed via the "1" key and various functions mapped to the "*" key and "#" key. The system is used by repeatedly pressing the same key to cycle through the letters for that key. For example, pressing the "3" key twice would indicate the letter "E". Pausing for a set period of time will automatically choose the current letter in the cycle, as will pressing a different key. **T9:** T9's objective is to make it easier to enter text messages. It allows words to be formed by a single keypress for each letter, which is an enormous improvement over the multi-tap approach used in conventional mobile phone text entry at the time, in which several letters are associated with each key, and selecting one letter often requires multiple keypresses. T9 combines the groups of letters on each phone key with a fast-access dictionary of words. It will then look up in the dictionary all words corresponding to the sequence of keypresses and order them by frequency of use. As T9 "gains familiarity" with the words and phrases the user commonly uses, it speeds up the process by offering the most frequently used words first and then letting the user access other choices with one or more presses of a predefined "Next" key. **SoftKey:** A **soft key** is a button flexibly programmable to invoke any of a number of functions rather than being associated with a single fixed function or a fixed set of functions. A softkey often takes the form of a **screen-labeled function key** located alongside a display device, where the button invokes a function described by the text at that moment shown adjacent to the button on

	the display. Soft keys are also found away from the display device, for example on the sides of cellular phones, where they are typically programmed to invoke functions such as PTT, memo, or volume control. Function keys on keyboards are a form of soft key. In contrast, a **hard key** is a key with dedicated function such as the keys on a number keypad. **Auditory Interface:** Auditory feedback in existing interfaces is commonly limited to various kinds of signals. Typical signals are sounds that indicate some sort of warning or alert, such as alarm sounds and low battery level warnings. Other signals provide feedback that some event has been successful, such as when buttons are pressed or machines are switched on. Yet, there are several types of events that have not been commonly associated with sound.
Q11	**Explain Implicit vs Explicit HCI?** Considering current computer technology interaction is explicit – the user tells the computer in a certain level of abstraction (e.g. by command-line, direct manipulation using a GUI, gesture, or speech input) what she expects the computer to do. This is considered as explicit interaction. Definition: Implicit Human Computer Interaction Implicit human computer interaction is an action, performed by the user that is not primarily aimed to interact with a computerized system but which such a system understands as input. The action of a user is always performed in a certain environment. Implicit interaction is based on the assumption that the computer has a certain understanding of our behavior in the given situation. This knowledge is then considered as an additional input to the computer while doing a task. A simple example is the garbage bin that scans in the bar code of products and reproduces the information for a suggested shopping list. The action performed by the user (e.g. throw away an empty can in a bin) is the same as with any other garbage bin. The recognition of the system (by scanning the bar code) and the built-in interpretation of the system (all things that go into the bin may be on the next shopping list again) make use of the action performed by the user. The user herself does not explicitly interact with the computer, thus the process describes an implicit interaction. As we see from the example implicit interaction is based on two main concepts.
Q12	**What is HCI , explain characteristics of HCI.(why it is important to study HCI?)** **What is HCI ?** Humans interact with computers in many ways; the interface between humans and computers is crucial to facilitating this interaction. Desktop applications, internet browsers, handheld computers, and computer kiosks make use of the prevalent graphical user interfaces (GUI) of today.[5] Voice user interfaces (VUI) are used for speech recognition and synthesizing systems, and the emerging multi-modal and Graphical user interfaces (GUI) allow humans to engage with embodied character agents in a way that cannot be achieved with other interface paradigms. The growth in human–computer interaction field has been in quality of interaction, and in different branching in its history. Instead of designing regular interfaces, the different research branches have had a different focus on the concepts of multimodality rather than unimodality, intelligent adaptive interfaces rather than command/action based ones, and finally active rather than passive interfaces. **Characteristics of HCI :** **1)** Good interface design is based on: User research: user goals, needs, etc. capabilities, expectations, mental models, etc. drives system and interface design Contextual inquiry, task analysis, etc. Knowledge of human cognitive capabilities and limitations **2)** Scenario-based design Design based on understanding of users, what they do, and why User models are used to develop personas composite archetypes based on behavioral data from many actual users personas represent a specific type of user of a particular interactive product a means of understanding user goals in specific contexts in general, each interface is designed for a single, primary persona Scenarios are narrative explanations of how personas use the product to achieve their goals goal-directed describe the interaction from the user's viewpoint can be used to define design requirements, design the interaction, and specify interface design elements

	3) Strive for consistency. Consistent sequences of actions; identical terminology; consistent commands 2. Enable frequent users to use shortcuts. Abbreviations, function keys, hidden commands, and macro facilities for expert users. 3. Offer informative feedback **4)** each interface is designed for a single, primary persona Scenarios are narrative explanations of how personas use the product to achieve their goals goal-directed describe the interaction from the user's viewpoint can be used to define design requirements.
Q13	**1.Explain eight fair information principles described by OECD** The Eight Fair Information Practices (From the OECD Guidelines on the Protection of Privacy) 1. **Collection Limitation Principle**. There should be limits to the collection of personal data and any such data should be obtained by lawful and fair means and, where appropriate, with the knowledge or consent of the data subject. 2. **Data Quality Principle**. Personal data should be relevant to the purposes for which they are to be used, and, to the extent necessary for those purposes, should be accurate, complete and kept up-to-date. 3. **Purpose Specification Principle**. The purposes for which personal data are collected should be specified not later than at the time of data collection and the subsequent use limited to the fulfillment of those purposes or such others as are not incompatible with those purposes and as are specified on each occasion of change of purpose. 4. **Use Limitation Principle**. Personal data should not be disclosed, made available or otherwise used for purposes other than those specified in accordance with Paragraph 9 except: a) with the consent of the data subject; or b) by the authority of law. 5. **Security Safeguards Principle**. Personal data should be protected by reasonable security safeguards against such risks as loss or unauthorized access, destruction, use, modification or disclosure of data. 6. **Openness Principle**. There should be a general policy of openness about developments, practices and policies with respect to personal data. Means should be readily available of establishing the existence and nature of personal data, and the main purposes of their use, as well as the identity and usual residence of the data controller. 7. **Individual Participation Principle**. An individual should have the right: a) to obtain from a data controller, or otherwise, confirmation of whether or not the data

	controller has data relating to him; b) to have communicated to him, data relating to him within a reasonable time; at a charge, if any, that is not excessive; in a reasonable manner; and in a form that is readily intelligible to him; c) to be given reasons if a request made under subparagraphs(a) and (b) is denied, and to be able to challenge such denial; and d) to challenge data relating to him and, if the challenge is successful to have the data erased, rectified, completed or amended. 8. **Accountability Principle**. A data controller should be accountable for complying with measures which give effect to the principles stated above.
Q14	**Explain Privacy issues in RFID tags** ● There is growing recognition that the same RFID application which is employed ostensibly to prevent counterfeiting or the theft of cash or goods could also be used to track an individual's spending habits, preferences and even physical movements. This information could be used for a host of unauthorised and unsolicited activities such as targeted marketing and dynamic pricing. **I) Pervasive use:** ● From a privacy standpoint, the current simplicity of the tag's response, which does not differentiate between requests based on origin or identity, is a flaw. Thieves could use the tags to locate the whereabouts of valuables and interested persons could obtain access to another's medical records or passport details, or trace another's spending habits or physical movements. ● The implications are therefore extensive but, at present, many concerns about RFID are largely theoretical. This is due to the fact that most RFID applications are not yet widely deployed because they are being trialled or because of cost. ● However, in anticipation of their pervasive use in future, it is not surprising that the potential effect on individuals and the adequacy of the legal framework are being considered now by consumers and interest groups. **II) Protection by law:** ● In terms of protection of data and privacy, the current EU data protection laws provide

	some comfort. If an application involves the processing of personal data, which can be used directly or indirectly to identify an individual, that application will be subject to certain core data protection principles contained in the Data Protection Directive (95/46). ● These principles include requirements of fair and lawful processing, retention of personal data for only as long as necessary and collection of data which is relevant and not excessive for the purposes it has been collected. ● A further requirement is informed consent, which means in many circumstances the details of how the information in a RFID tagwill be used will need to be made clear at the outset. ● In addition, the requirement of fair and lawful processing is broad and means that manufacturers and deployers of RFID tags would need to label those products containing tags, provide information on how to disable or remove the tags and inform consumers when RFID readers are within range.
Q15	**Explain William L. Prosser described a set of four privacy torts.** ● William Prosser, in writing his own influential article on the privacy torts in American law, attributed the specific incident to an intrusion by journalists on a society wedding, but in truth it was inspired by more general coverage of intimate personal lives in society columns of newspapers. ● Warren and Brandeis begin their article by introducing the fundamental principle that "the individual shall have full protection in person and in property." They acknowledge that this is a fluid principle that has been reconfigured over the centuries as a result of political, social, and economic change. ● The first three paragraphs of the essay describe the development of the common law with regard to life and property. Originally, the common law "right to life" only provided a remedy for physical interference with life and property. But later, the scope of the "right to life" expanded to recognize the "legal value of sensations." For example, the action of battery—a protection against actual bodily injury—gave rise to the action of assault—fear of actual bodily injury. Similarly, the concept of property expanded from protecting only tangible property to intangible property. ● Beginning with the fourth paragraph, Warren and Brandeis explain the desirability and necessity that the common law adapt to recent inventions and business methods—namely, the advent of instantaneous photography and the widespread circulation of newspapers, both of which have contributed to the invasion of an individual's privacy.

	Warren and Brandeis take this opportunity to excoriate the practices of journalists of their time, particularly aiming at society gossip pages. ● The press is overstepping in every direction the obvious bounds of propriety and of decency. Gossip is no longer the resource of the idle and of the vicious, but has become a trade, which is pursued with industry as well as effrontery. To satisfy a prurient taste the details of sexual relations are spread broadcast in the columns of the daily papers. To occupy the indolent, column upon column is filled with idle gossip, which can only be procured by intrusion upon the domestic circle.
	Explain eight fair information principles described by OECD The Eight Fair Information Practices (From the OECD Guidelines on the Protection of Privacy) 1. **Collection Limitation Principle**. There should be limits to the collection of personal data and any such data should be obtained by lawful and fair means and, where appropriate, with the knowledge or consent of the data subject. 2. **Data Quality Principle**. Personal data should be relevant to the purposes for which they are to be used, and, to the extent necessary for those purposes, should be accurate, complete and kept up-to-date. 3. **Purpose Specification Principle**. The purposes for which personal data are collected should be specified not later than at the time of data collection and the subsequent use limited to the fulfillment of those purposes or such others as are not incompatible with those purposes and as are specified on each occasion of change of purpose. 4. **Use Limitation Principle**. Personal data should not be disclosed, made available or otherwise used for purposes other than those specified in accordance with Paragraph 9 except: a) with the consent of the data subject; or b) by the authority of law. 5. **Security Safeguards Principle**. Personal data should be protected by reasonable security safeguards against such risks as loss or unauthorized

access, destruction, use, modification or disclosure of data.

6. **Openness Principle**. There should be a general policy of openness about developments, practices and policies with respect to personal data. Means should be readily available of establishing the existence and nature of personal data, and the main purposes of their use, as well as the identity and usual residence of the data controller.

7. **Individual Participation Principle**. An individual should have the right:

a) to obtain from a data controller, or otherwise, confirmation of whether or not the data controller has data relating to him;

b) to have communicated to him, data relating to him within a reasonable time; at a charge, if any, that is not excessive; in a reasonable manner; and in a form that is readily intelligible to him;

c) to be given reasons if a request made under subparagraphs(a) and (b) is denied, and to be able to challenge such denial; and

d) to challenge data relating to him and, if the challenge is successful to have the data erased, rectified, completed or amended.

8. **Accountability Principle**. A data controller should be accountable for complying with measures which give effect to the principles stated above.

2. Explain William L. Prosser described a set of four privacy torts.

- William Prosser, in writing his own influential article on the privacy torts in American law, attributed the specific incident to an intrusion by journalists on a society wedding, but in truth it was inspired by more general coverage of intimate personal lives in society columns of newspapers.

- Warren and Brandeis begin their article by introducing the fundamental principle that "the individual shall have full protection in person and in property." They acknowledge that this is a fluid principle that has been reconfigured over the centuries as a result of

political, social, and economic change.

- The first three paragraphs of the essay describe the development of the common law with regard to life and property. Originally, the common law "right to life" only provided a remedy for physical interference with life and property. But later, the scope of the "right to life" expanded to recognize the "legal value of sensations." For example, the action of battery—a protection against actual bodily injury—gave rise to the action of assault—fear of actual bodily injury. Similarly, the concept of property expanded from protecting only tangible property to intangible property.

- Beginning with the fourth paragraph, Warren and Brandeis explain the desirability and necessity that the common law adapt to recent inventions and business methods—namely, the advent of instantaneous photography and the widespread circulation of newspapers, both of which have contributed to the invasion of an individual's privacy. Warren and Brandeis take this opportunity to excoriate the practices of journalists of their time, particularly aiming at society gossip pages.

- The press is overstepping in every direction the obvious bounds of propriety and of decency. Gossip is no longer the resource of the idle and of the vicious, but has become a trade, which is pursued with industry as well as effrontery. To satisfy a prurient taste the details of sexual relations are spread broadcast in the columns of the daily papers. To occupy the indolent, column upon column is filled with idle gossip, which can only be procured by intrusion upon the domestic circle.

3. Explain Privacy issues in RFID tags

- There is growing recognition that the same RFID application which is employed ostensibly to prevent counterfeiting or the theft of cash or goods could also be used to track an individual's spending habits, preferences and even physical movements. This information could be used for a host of unauthorised and unsolicited activities such as targeted marketing and dynamic pricing.

I) Pervasive use:

- From a privacy standpoint, the current simplicity of the tag's response, which does not differentiate between requests based on origin or identity, is a flaw. Thieves could use the tags to locate the whereabouts of valuables and interested persons could obtain access to another's medical records or passport details, or trace another's spending habits or physical movements.
- The implications are therefore extensive but, at present, many concerns about RFID are largely theoretical. This is due to the fact that most RFID applications are not yet widely deployed because they are being trialled or because of cost.
- However, in anticipation of their pervasive use in future, it is not surprising that the potential effect on individuals and the adequacy of the legal framework are being considered now by consumers and interest groups.

II) Protection by law:

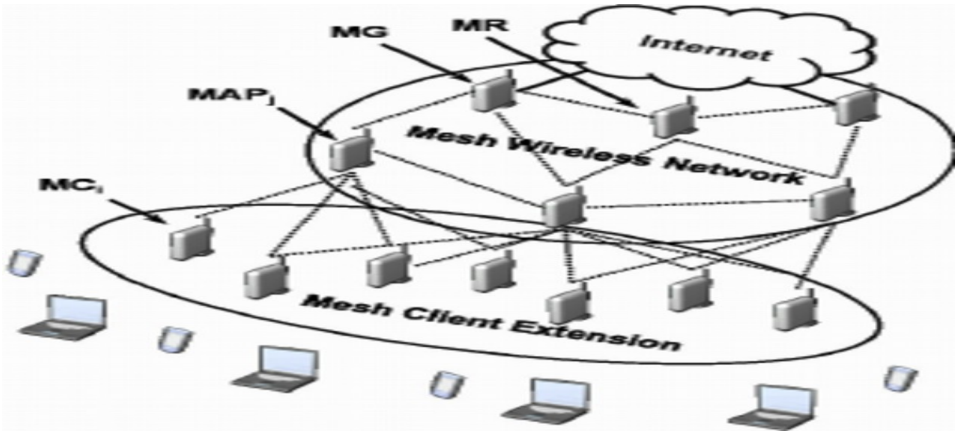
- In terms of protection of data and privacy, the current EU data protection laws provide some comfort. If an application involves the processing of personal data, which can be used directly or indirectly to identify an individual, that application will be subject to certain core data protection principles contained in the Data Protection Directive (95/46).
- These principles include requirements of fair and lawful processing, retention of personal data for only as long as necessary and

	collection of data which is relevant and not excessive for the purposes it has been collected. ● A further requirement is informed consent, which means in many circumstances the details of how the information in a RFID tag will be used will need to be made clear at the outset. ● In addition, the requirement of fair and lawful processing is broad and means that manufacturers and deployers of RFID tags would need to label those products containing tags, provide information on how to disable or remove the tags and inform consumers when RFID readers are within range.
	Explain difference between mesh,wireless and overlay network with diagram. WIRELESS MESH NETWORK A wireless mesh network (WMN) is a communications network made up of radio nodes organized in a mesh topology. It is also a form of wireless ad hoc network. A mesh refers to rich interconnection among devices or nodes. Wireless mesh networks often consist of mesh clients, mesh routers and gateways. Mobility of nodes is less frequent. If nodes constantly or frequently move, the mesh spends more time updating routes than delivering data. Mesh clients are often laptops, cell phones, and other wireless devices. Mesh routers forward traffic to and from the gateways, which may, but need not, be connected to the Internet. The coverage area of all radio nodes working as a single network is sometimes called a mesh cloud. Main characteristics and benefits of WMN as: • Multi hop wireless network: extends coverage range without sacrificing the channel capacity, without a direct line of sight (LOS) link. • Ad hoc networking: supports self forming, self healing, and self organisation for multipoint to multipoint communications enabling the network to grow gradually as needed. • Mobility dependence on the type of mesh nodes: mesh routers usually have minimal mobility, while mesh clients can be stationary or mobile nodes. • Multiple types of network access: both backhaul access to the Internet

and peer to peer (P2P) communications are supported.

• Mesh routers usually do not have strict power consumption constraints and may not be appropriate for some types of mesh clients, those that act as sensors in a sensor network where power consumption is the primary concern.

• WMNs are compatible and can be integrated with multiple IEEE 802.11 (Wifi) type networks.

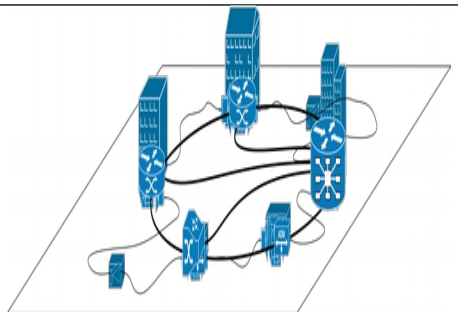


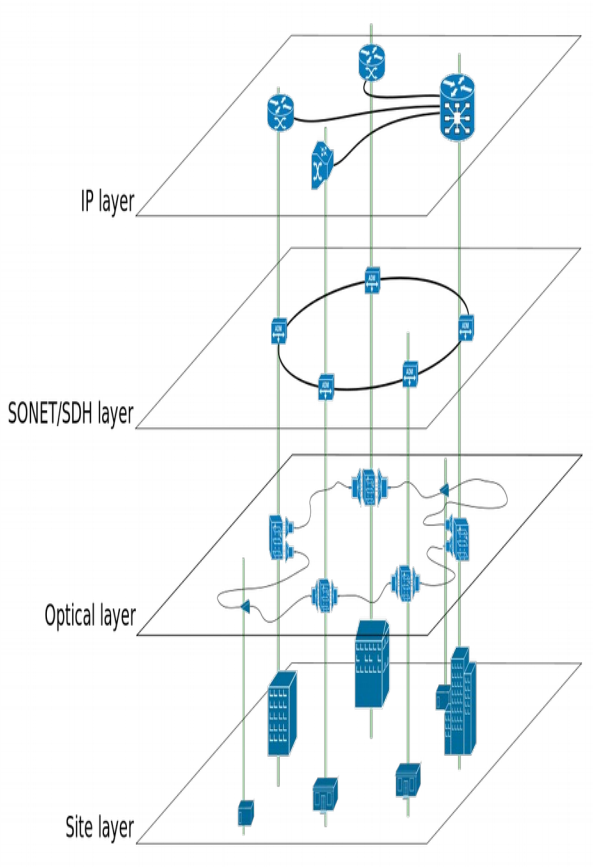
WMNs aim to diversify the capabilities of ad hoc networks

infrastructure to one or more applications. It handles the forwarding and handling of application data in ways that are different from or in competition with the basic underlying physical network such as the Internet or PSTN. It can be operated in an organised and coherent way by third parties, which may include collections of end users. Many standard applications such as email, VoIP, Web search engines, etc. can benefit from providing services in special intermediate service nodes which can, for example, cache information.

An overlay network is a telecommunications network that is built on top of another network and is supported by its infrastructure. An overlay network decouples network services from the underlying infrastructure by encapsulating one packet inside of another packet. After the encapsulated packet has been forwarded to the endpoint, it is de-encapsulated.

Nodes in the overlay network can be thought of as being connected by virtual or logical links, each of which corresponds to a path, perhaps through many physical links, in the underlying network. For example, distributed systems such as peer-to-peer networks and client-server applications are overlay networks because their nodes run on top of the Internet.





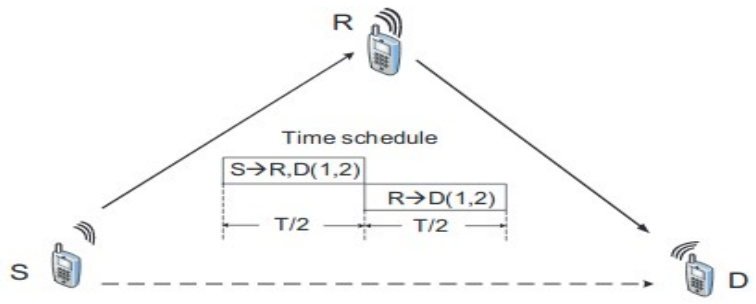
Write short note on cooperative network.

just have access to one network connection this is often in order to simplify design, to reduce costs or because no redundancy is necessary. Some other network access devices have inbuilt support for heterogeneous network access, e.g., to Bluetooth, to infrared, to WiFi and to GSM networks. Each of these networks must be used in isolation, they do not interoperate. A third case is that multiple types of the same type of physical and network layer

may exist because multiple independent users and providers may offer overlapping wireless networks within the same vicinity but yet again these do not interoperate. These can overlap and the coincidence of multiple overlapping networks will increase as more networks are installed but yet again these networks do not interoperate.

Cooperative communication is designed to enable single antenna mobile access devices to reap some of the benefits of being Multiple Input Multiple Outputs (MIMO) systems (Nosratinia et al., 2004). A specific problem that cooperative communication can solve at the physical media layer concerns signal fading because thermal noise, shadowing due to fixed obstacles and due to signal attenuation can vary significantly over the course of a given transmission.

In cooperative networks, each node acts two roles in the network transmission: source node and relay node. Here, relay transmission is a main feature of cooperative communication. Figure shows a classic cooperative network model and we call it cooperative link. A cooperative link between the source (S) and destination (D)includes two different transmission channels. The dash line is direct transmission channel from the source directly to the destination, while the combined solid lines are relay transmission channels from the source through the relay (R) to the destination. A typical cooperative transmission can be divided into two stages (i.e., time slots). During the first stage, the source broadcasts its information where both relay and destination nodes are listening. During the second stage, the relay forwards the received information to the destination. Therefore, the destination node receives two copies of the same packets transmitted through different wireless channels.



(a) An example of a wireless cooperative link

In essence, cooperative communication treats communication nodes as it they are part of a WMN but multicasts the same message over multiple routes with different fading effects to the same receiver. The other benefit, apart from improving the recovery of the signal in the face of fading, is that power consumption can be reduced for transmission even when it ought to increase as multiple users are now using each transmitter. Overall less

	power can then be used to cover for fading.
	Q3. Explain network design issues ubicomp Network. ● **Network Access Control** Different networks use a range of access control techniques to handle network resource allocation problems and to allow multiple users to access network media that has a limited Capacity. GSM is designed to use Time Division Multiple Access (TDMA) to share access among multiple users. In TDMA, several users can split the transmission time into a slot per channel. Code Division Multiple Access or CDMA, is used by many US mobile carriers, in which voice signals are spread across a band of frequencies or channels using a spread spectrum. Later generations of wireless networks such as 3G are designed to use much more efficient multi access methods such as Wideband Code Division Multiple Access (WCDMA) that can support higher bandwidths. WLANs are typically based on sharing frequencies between several active users. Because many simultaneous users may cause packet collisions, and hence waste channel bandwidth, and because it can be difficult to detect some nodes, i.e., hidden nodes, it is important that packet collisions be avoided. Hence WLANs typically use a Multiple Access with Collision Avoidance (MACA) type transmission protocol. Here a wireless network node makes an announcement by sending a control packet, a Request To Send (RTS) with the length of the data frame to send before the packet is sent. This is sent before a sender sends any actual packets and informs other nodes to keep silent. If the receiver allows the transmission, it replies to the sender in a signal called Clear To Send (CTS) with the length of the frame that is about to receive. Any other nodes hearing a RTS signal refrain from sending until they hear a CTS signal. ● **Ubiquitous Versus Localised Access** Networks may also be designed to support only local access by organisations, to serve only particular populations of users and applications and not to be accessed remotely across a wide area. The driver for this is the need to tailor services for local needs. Some services that only serve a local area, e.g., local restaurants that only serve customers that visit it, may advertise only to local customers. The restaurant may decide to advertise and broadcast to any users in the vicinity as they have a surplus of food that will not keep for users who need to travel from longer distances. Services can be restricted to local access because they are only available on wired local networks that are situated in buildings or because they are offered on wireless local area networks and because they need to be kept internal by an organisation. Local services can also be designed to have access control to enable them to be accessed remotely and securely

by a closed group of users, operating as Virtual Private Networks or VPNs.

- **Controlling Network Access: Firewalls, NATs and VPNs**

Many ICT resources connected to the Internet are protected to control access to specific resources by specific users or closed user group. If access is not restricted, then freeloaders could gain access to ICT resources that they have no stake in and denial of service would increase as unknown users overload the use of resources at non deterministic times. There are several methods to protect access to local networks based upon restricting access to computers with designated media access control or IP network addresses or based upon certificate based authentication.

A firewall is a router or special purpose computer that monitors all packets entering and leaving and network and filters packets, e.g., based upon network address, thus restricting access to packets with a designated network address.

Network Address Translation (NAT) is a computer that acts as a proxy 27 to translate IP addresses inside a network, keeping them private, to other IP addresses that are visible outside the network.

- **Group Communication: Transmissions for Multiple Receivers**

Sending the same message from a single source to a defined group of multiple receivers, multicast communication or group communication, can be useful in order to provide some fault tolerance for the content, or in order to share information within a group, e.g., a conference, or when a sender cannot or does not want to limit themselves to interaction with a particular receiver. There may be hardware support for multicast so that large group messages can be sent efficiently.

- **Internetworking Heterogeneous Networks**

Ideally, universal access means that any type of data may be accessed simultaneously anywhere over any kind of network. Historically, many separate types of communication network exist that are not interlinked. Networks are heterogeneous in terms of the physical media that electromagnetic signals propagate through. For example, signals may propagate through wired copper or optical fibre networks or through wireless or Over The Air (OTA) networks. These different types of physical links of the network have different signal capacities and have different signal attenuations and hence different requirements for signal amplification and repeaters.

Networks are heterogeneous in terms of the types of content or media they exchange, such as video, audio and (alphanumeric) data. Currently,

separate networks are still predominantly used to distribute audio (voice and music), video and data. Networks are heterogeneous in terms of the types of applications that use them, in terms of their architecture or topology and in terms of how the individual networks are interlinked and managed.

- **Service-Oriented Networks**

Traditionally, different application services were coupled to specific networks because different applications need different levels of support for data transmission functions, such as latency, 32 sequencing, performance and reliability, channel sharing, data control and security. It is simpler to design networks to support one specific set of application requirements rather than to support multiple applications that have different messaging requirements because these may conflict. However, this has the disadvantage that more complex multi service networks need to be provided and maintained and it is harder to integrate data from applications that exist on different networks.

- **Global Use: Low-Cost Access Networks for Rural Use**

In theory, wireless networks could be ubiquitous but in practice they aren't in many regions. This is often because communication and content delivery networks are built and operated as commercial businesses that have to generate sufficient revenue to exist. Currently, the total worldwide Internet usage penetration was only about 18% but only about 4% in Africa (Miniwatts, 2007). This is contrast to 29% of the global population using GSM type mobile phone technology (GSMWorld, 2007), more if other types of mobile phone are also included. People in some rural areas may not be able to pay either to install the local (access) loop or to subscribe to services across the communications and CDNs so low cost networks and access terminals are needed. Typically, a wireless local access loop is used t