SNS COLLEGE OF TECHNOLOGY
COIMBATORE-35
DEPARTMENT OF BME

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UNIT II

TELEMEDICAL TECHNOLOGY

1. **List** the types of senses used by physician to observe patient's condition**[Remember]**
   Sight, sound, touch, taste, smell are the senses used by physician to observer patient's condition

2. **List** the sensory data that the can be converted into electrical impulses**[Remember]**

- In telemedicine, the sensory data such as sight, sound are converted into electrical impulses for transmission to the remote physician.
- Smell and taste stimuli into electrical signals are still in experimental stage. The touch data can be translated into electrical impulses but the reverse process is difficult and not well understood.

3. **Classify** the information in telemedicine**[Remember]**

- The information(data) is classified into four types
  1. Text and data
  2. Audio
  3. Still(single) images
  4. Video(sequential images)

Source	Type	Typical file size
Patient notes	Text	< 10 KB
Electronic stethoscope	Audio	100 KB
Chest X-ray	Still image	1 MB
Foetal ultrasound (30 s)	Video	10 MB

4. **List** the classification of Text and data information in tele-medicine**[Remember]**
   Electronic documents, paper format, image format and text information before and after tele-consultation are the classification of Text and data information in tele-medicine.

5. **Wha**t are the ways the audio information can be transmitted in tele-medicine**[Remember]**
   i) Analogue signals through Public Switched telephone network/Plain old telephone system
   ii) Digital signals through networks

6. **How** analogue signal is converted into digital signal? **[Remember]**
   Analogue sound is digitized by sampling its amplitude at discrete time intervals to recreate the waveform

7. **Define** is quantisation or amplitude round-off errors? **[Remember]**
   Digital sample value approximates the analogue signal at a given instant.
   or
   The difference between an input value and its **quantized** value (such as round-off **error**) is referred to as **quantization error**.

8. **What** is WAV format**[Remember]**

- Waveform Audio File Format, pronounced "wave" or (Audio for Windows) is a Microsoft and IBM audio file format standard for storing an audio bitstream on PCs.
- It is the main format used on Microsoft Windows systems for raw and typically uncompressed audio

9. **Specify** the two widely used formats for analogue video in telemedicine**[Remember]**
    1. National Television Standards Committee(NTSC)
        - Used in North America and Japan
        - Contains 525 lines per picture and frame rate of 30 pictures per second
    2. Phase Alternating Line(PAL)

- Used in Western Europe and Australasia
- Contains 625 lines per picture and frame rate of 25 pictures per second

10. When we **use** video conferencing than broadcast television to send video in telemedicine**[Understand]**
    To demonstrate a patient's mobility after a hip replacement, it is usally sufficient to used videoconferencing unit rather than broadcast television.

11. **Specify** the other formats for analogue video **[Remember]**
    i) Sequential couleur a Memoire(SECAM)
    - Used in France, Russia and Warsaw Pact

    ii) Common Intermediate Format(CIF)
    - Introduced to provide compatibility between NTSC and PAL
    - Offers lower resolution of 288 lines per picture at 30 pictures per second.

12. **Delineate** PSTN. **[Remember]**

- The public switched telephone network (PSTN) refers to the international telephone system that uses copper wires to carry analog voice data. It consists of a collection of individual telephones that are hardwired to a public exchange.
- The public switched telephone network was formerly known as Plain old telephone system.

13. **Specify** the merits and demerits of using PSTN?**[Understand]**
    Merits: cheap, Ubiquitous
    Demerits: Slow, not suitable for high resolution

14. **Describe** ISDN? **[Remember]**
    - Integrated services digital network is the replacement of PSTN
    - Provides digital service that operates over standard telephone lines.

15. **List** the two services provided by ISDN**[Remember]**
    The service provided by ISDN is

    a) Basic Rate Interface (BRI)
    - Offers basic service that provides the lowest level of performance but at correspondingly low price
    - intended for the home and small enterprise
    - only has one channel for each direction

    b) Primary Rate Interface (PRI)
    - Offers main services
    - intended for larger users
    - PRI uses multiple channels, the direction can be configured in order to accommodate whichever needs the most bandwidth

16. **Classify** the types of Channel used in ISDN**[Remember]**
    - B-channel carries the main data (i.e., actual data). (The "B" stands for "bearer" channel.)
    - The D-channel carries control and signalling information. (The "D" stands for "delta" channel.)

17. **How** many number of B and D channels are used in BRI and PRI**[Remember]**
    - The Basic Rate Interface consists of two 64 Kbps B-channels and one 16 Kbps D-channel. Thus, a Basic Rate Interface user can have up to 128 Kbps service.
    - The Primary Rate Interface consists of 23 B-channels and one 64- Kpbs D channel in the United States or 30 B-channels and 1 D-channel in Europe.

18. **Difference** between PRI and BRI**[Understand]**
    i. ISDN PRI is the main level service while the ISDN BRI is an entry level service
    ii. ISDN PRI uses more channels than ISDN BRI
    iii. ISDN PRI is faster than ISDN BRI

19. **List** the Advantages and Disadvantages of ISDN**[Understand]**

    Advantages
    - ✓ Highly flexible since it is scalable(i.e. extra lines can be added later)
    - ✓ Technology can be used for multipoint control
    - ✓ It is often the first choice for telemedicine
    - ✓ lSDN (basic rate) 128 Kbps : Cheap. Flexible
    - ✓ ISDN (Primary rate) < 2 Mbps : Fast, high quality

    Disadvantages
    - ✓ lSDN (basic rate) 128 Kbps : Slow, patchy availability
    - ✓ ISDN (Primary rate) < 2 Mbps :Expensive, patchy availability

20. What is ANT**?[Remember]**
    - ✓ ANT is a ultra-low power, short-range wireless communicate designed for sensor networks.
    - ✓ Does communication for point-to-point or more complex network topologies.

21. **List** the ways Internet can be used in telemedicine**?[Remember]**
    - Establish connectivity through ordinary personal computers and mobile phones
    - Exchange electronic main(email) between patients, attending doctors and specialists
    - Post information for the benefit of others to access and update it frequently
    - Access and transfer multimedia information which includes sound, data, images and video

22. **Specify** internet usage in medical field with reference to telemedicine**[Remember]**
    a) Remote diagnosis and consulting
    b) Patient care and support
    c) Medical information access
    d) Emergency/epidemic support
    e) Teleworking opportunities for the disabled
    f) Preventative care information and guidance
    g) Continuing medical education and training

23. **Advantages** of using wireless communication in telemedicine**[Understand]**
    Ease of use, reduced risk of infection, reduced risk of failure, reduced patient discomfort, enhanced mobility and low cost of care delivery

24. **List** the driving force for using wireless communication in telemedicine?**[Remember]**
    Mobility and convenience are the two driving force for using wireless communication.

25. **Specify** the application of wireless technologies in the field of telemedicine**[Remember]**
    - Monitoring for critically ill patients under observation in intensive care and recovery rooms
    - Monitoring of old people in old age homes and assistance systems for chronically sick persons
    - Sending reminders to senior citizens and patients undergoing treatment
    - Monitoring performance of implanted devices and monitoring of fitness data

26. **Lis**t the reason for using wireless technology in the hospital set up**[Remember]**
    - In older hospital building, modern healthcare services overcome the installation of cabling for wired LAN
    - Wireless network allows to configure various topologies which could be suitable for hospital specific and changing requirements of a medical facility , providing scope for scalability
    - A wireless LAN can be designed to work as an independent network, also in association with an already existing terrestrial LAN

27. **Specify** the example for using LAN in telemedicine?**[Understand]**
    Used in the transmission of a radiological image of an ICU admitted patient from the Radiology Department and back to the ICU workstation for a quick review and action by the attending doctor. These images can also be viewed by other physicians or other healthcare professionals at other sites in the hospital

28. **Where** satellite communication is used in telemedicine**[Remember]**
    Satellite communication is used for implementing telemedicine projects to remote and isolated areas where reliability of terrestrial communication network facility is lacking