

## Unit 9: Telemedicine and Remote Monitoring Systems

### I. Pre-reading

#### A. New Vocabulary

Word / Term	Form	Definition / Synonym	Persian Translation
telemedicine	n	delivering healthcare remotely via technology	پزشکی از راه دور / تله‌مدیسین
remote monitoring	n	observing patient data from a distance	پایش از راه دور
wearable	adj	small electronic device worn on the body	پوشیدنی
transmission	n	sending information or signals	انتقال
real-time	adj	happening instantly as events occur	بلادرنگ / آنی
consultation	n	meeting or discussion with a medical professional	مشاوره
bandwidth	n	capacity of a network connection	پهنای باند
cloud computing	n	using internet-based servers for data storage	رایانش ابری
data encryption	n	securing data by converting it into code	رمزنگاری داده
connectivity	n	ability to link or communicate electronically	اتصال‌پذیری
alert	n	signal or warning message	هشدار
privacy	n	protection of personal information	حریم خصوصی
device integration	n	combining multiple devices into one system	یکپارچه‌سازی دستگاه‌ها
transmission delay	n	time lag in sending information	تأخیر انتقال
healthcare accessibility	n	ease of obtaining medical services	دسترسی‌پذیری خدمات سلامت
vital signs	n	measurements of essential body functions	علامات حیاتی

## B. Pre-reading Questions

1. What is telemedicine?
  2. How do remote monitoring systems work?
  3. What are the benefits of wearable medical devices?
  4. What challenges affect telemedicine systems?
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## II. Reading

### Telemedicine and Remote Monitoring Systems

**Telemedicine** uses digital communication technologies to deliver healthcare services remotely. It allows doctors and patients to **consult**, **diagnose**, and **monitor** health conditions without being physically in the same place. This approach increases **healthcare accessibility**, especially in rural or underserved areas.

**Remote monitoring systems** collect **vital signs** such as heart rate, blood pressure, and oxygen saturation using **wearable sensors**. The data is transmitted through wireless networks to healthcare providers for real-time evaluation. **Alerts** can notify doctors when parameters exceed safe limits.

Biomedical engineers design these systems by integrating **sensors**, **microcontrollers**, **communication modules**, and **cloud computing** platforms. They ensure **data accuracy**, **security**, and **connectivity** between devices. Internet of Medical Things (**IoMT**) networks connect multiple devices, enabling continuous and intelligent patient monitoring.

Telemedicine also supports **remote consultation** through video conferencing and mobile applications, allowing doctors to examine patients and review reports online. During pandemics or emergencies, it helps reduce hospital crowding and infection risk.

However, challenges such as **data privacy**, **transmission delays**, and limited **internet bandwidth** can affect system reliability. Engineers address these issues through **data encryption**, **optimization**, and **standardization** of medical data formats.

In conclusion, telemedicine and remote monitoring systems demonstrate how biomedical engineering enhances patient care beyond hospital walls. They combine medical expertise, electronics, and network technologies to make healthcare more accessible, efficient, and patient-centered.

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## III. Post-reading

### A. True (T), False (F), or Not Given (NG)

1. Telemedicine requires patients to visit hospitals.
  2. Remote monitoring uses wearable sensors.
  3. Telemedicine is only for emergencies.
  4. Biomedical engineers design system hardware and software.
  5. IoMT connects medical devices for data sharing.
  6. Privacy and security are important concerns.
  7. Poor internet quality can affect telemedicine.
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## B. Multiple Choice

1. What is the main goal of telemedicine?  
a) Build more hospitals      b) Deliver healthcare remotely  
c) Increase hospital stays      d) Replace doctors completely
  2. Which component measures physiological data?  
a) Cloud system      b) Sensor      c) Display screen      d) Video chat
  3. Which technology stores patient data online?  
a) Cloud computing      b) Encryption      c) Processor      d) IoMT
  4. What problem does data encryption solve?  
a) Low power usage      b) Privacy protection  
c) Cost reduction      d) Temperature control
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## C. Fill in the blanks

1. Telemedicine uses digital communication technologies to deliver healthcare services .
2. Remote monitoring systems measure vital signs such as heart rate and .
3. Wearable  collect physiological data for real-time evaluation.
4. Alerts notify doctors when patient parameters exceed safe .
5. Biomedical engineers integrate sensors, microcontrollers, and  modules to build these systems.
6. IoMT networks connect multiple devices to enable continuous patient .
7. System performance can be affected by data privacy issues and transmission .