



SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
COIMBATORE-35
DEPARTMENT OF BIOMEDICAL ENGINEERING



23BMT203 BIOMEDICAL TRANSDUCERS AND SENSORS

II BME - IV SEM

Prepared by,
Dr. K. Manoharan,
Associate Professor,
BME Department.
SNS College of Technology.

Unit 3 Measurement of Pressure & Blood Flow

- 1. What is the principle of a catheter-based pressure measurement system?**
 - A catheter-based system measures pressure by inserting a fluid-filled or electronic catheter into a body cavity or blood vessel, where pressure is transmitted to an external sensor.
- 2. How do fluid-filled catheters measure pressure?**
 - They transmit pressure from the blood vessel or cavity through a fluid column to an external transducer that converts pressure into an electrical signal.
- 3. What are the advantages of catheter-based pressure sensors?**
 - They provide direct and real-time pressure readings inside blood vessels or body cavities, allowing for accurate diagnosis and monitoring.
- 4. What is a diaphragm-type pressure sensor?**
 - It consists of a flexible diaphragm that deflects under applied pressure, converting mechanical deformation into an electrical signal using piezoelectric, capacitive, or resistive methods.
- 5. How does a capacitive diaphragm pressure sensor work?**
 - Pressure causes the diaphragm to move, changing the capacitance between two plates, which is converted into a measurable electrical signal.
- 6. What is the advantage of a diaphragm-type sensor over a catheter sensor?**
 - Diaphragm sensors are non-invasive, require less maintenance, and have no risk of infection compared to catheter-based sensors.
- 7. What is the role of piezoresistive elements in diaphragm pressure sensors?**
 - Piezoresistive elements change resistance when the diaphragm deforms, providing an electrical signal proportional to pressure.
- 8. What type of pressure can diaphragm sensors measure?**
 - They can measure both absolute and differential pressures, depending on the design.
- 9. How does Doppler ultrasound measure blood pressure?**
 - It uses the Doppler effect to detect the velocity of blood flow, which can be correlated with pressure changes.
- 10. What is the Doppler effect in blood flow measurement?**
 - It is the frequency shift of ultrasound waves reflected by moving red blood cells, used to determine blood velocity.
- 11. What is the Applanation method in blood pressure measurement?**
 - It involves flattening an artery using a sensor to measure the external pressure required to balance arterial pressure.

12. What are the advantages of the applanation method?

- It provides continuous, non-invasive blood pressure monitoring and can be used for arterial stiffness assessment.

13. What is the principle of an electromagnetic blood flow meter?

- It applies Faraday's law, where blood moving through a magnetic field induces a voltage proportional to its velocity.

14. What are the advantages of electromagnetic blood flow meters?

- They provide continuous, real-time flow measurement and work independently of the hematocrit level.

15. How does an ultrasonic blood flow meter work?

- It uses ultrasound waves, either Doppler or transit-time principles, to measure blood flow velocity.

16. What are the advantages of ultrasonic blood flow meters over electromagnetic flow meters?

- They are non-invasive, work with both conductive and non-conductive fluids, and provide directional flow information.

17. What is the working principle of a strain gauge force plate?

- A force plate uses strain gauges to measure the deformation caused by applied force, converting it into an electrical signal proportional to ground reaction force.

18. How is foot force distribution measured?

- Pressure sensors embedded in footplates or insoles record force distribution across different regions of the foot during movement.

19. Why are force plates used in biomechanics?

- They help analyze gait, balance, and ground reaction forces, assisting in sports science, rehabilitation, and injury prevention.

20. What is the role of capacitive sensors in foot force measurement?

- They detect changes in capacitance due to applied force, mapping pressure distribution across the foot surface.