

VALLIAMMAI ENGINEERING COLLEGE
(Department of Computer science and Engineering)
NE7001 SENSING TECHNIQUES AND SENSORS
QUESTION BANK

Unit I

PART- A

1. Define Sensor and how it is different from transducer and actuator?.
2. Write down the classification of sensors?.
3. Define Transfer function characteristic in sensor?
4. How Full-scale input is different from Full-scale output?
5. Define Saturation and Dead band?
6. Write down the phenomenon of light?.
7. List out basic SI units of various Quantities.
8. List out different types of error characteristics.
9. How direct sensor differs with Complex sensor?
10. State Tribo-electric effect?
11. What is dielectric constant?
12. How electricity differs with magnetism?
13. State the characteristics of a Permanent Magnet?
14. List out the different types of Magnets?
15. Define self-induction and induced voltage?
16. List out the factors which depends induced voltage?
17. Define the types of resistivity.
18. Give some properties of piezoelectric films?
19. List out the fundamental properties of Heat.
20. Give some dynamic models of sensors elements.

PART-B

1. Explain Data Acquisition System in Detail.
2. How magnetism, resistance relates with physical principles of sensing
3. How solenoid is different from Toroid.
4. How electric charge, field and potential is related with sensors?
5. Describe about different effects in generation of electric charges and Explain how Sound, Light and Heat relates with Sensors.
6. How conductance relates with direct sensor.
7. Explain the concept of Peizoelectric and pyroelectric effect.
8. Explain Seeback effect.
9. Explain Petlier effect.
10. Explain Hall effect?

Unit II

PART- A

1. Define reflection and refraction.
2. Define Radiometric and Photometric terminologies.
3. Define Fractional binary and Integer binary?
4. A glass meniscus lens ($n = 1.5$) has a concave surface of radius -40 cm and a convex surface whose radius is $+20$ cm. What is the focal length of the lens?.
5. What must be the radius of the curved surface in a plano-convex lens in order that the focal length be 25 cm?
6. Define voltage follower?
7. Define Single and dual fiber optic sensors?
8. How the bridge circuits is in balanced or unbalanced state.
9. How to determine Bridge insensitivity with respect to impedance?
10. Write down the difference between Primary Cell and Secondary Cell?
11. Calculate lifetime for a primary cell if the battery is rated as capacity of 100mAh , the circuit operating current consumption about 10mA and the circuit works only 12min every hour?
12. Define false positive and false negative detection?
13. Give the frequency response of an accelerometer?
14. Define Doppler Effect?
15. Draw the circuit diagram for ADC?
16. List several noises in sensors and circuits?
17. List some rules while applying electrostatic shields?
18. List some practical guidelines to follow magnetic shielding?
19. Define seebeck noise.
20. How shot noise differs from Schottky noise.

PART-B

1. Describe Dual Slope Conversion & Successive Approximation Converter.
2. Why Direct Digitization and Processing in necessary in Sensors
3. Explain Modulating Oscillator and Switched capacitance converter
4. Write down various noises in sensors and circuits.
5. Explain briefly about the V/F converters and its types?
6. How radiometry differs from Photometry and How windows is different from mirrors.
7. Explain in detail about the difference of Lenses with Fresnel Lens.
8. How displacement sensor relates with optical Fiber & Concentrators
9. Describe about operation of Op-amp in open loop and closed loop conditions in detail.
10. Explain in detail about the charge to voltage and current to voltage convertors.
11. Briefly describe about the principle of instrumentation amplifier?

Unit III

PART- A

1. Write down the different types of Occupancy sensors?
2. Write down the different types of Motion sensors?
3. Define Doppler frequency.
4. How sensor is structured?
5. Define Image Distortion.
6. How to find the focal length of a facet lens.
7. Differentiate far-infrared and near-infrared motion detectors.
8. How to analyze the efficiency of PIR sensor.
9. Define pyroelectricity.
10. List several characteristics of an accelerometer.
11. Define the principle of conservation of angular momentum.
12. What are the ways to build a vibrating gyro?
13. What are the methods for path detection in optical gyroscopes.
14. Define sagnac effect.
15. List out typical properties of a piezoelectric cable.

PART-B

1. Describe about operation of Microwave occupancy detectors in detail.
2. Explain in detail about the working principle of capacitive occupancy detectors.
3. Describe in detail about Pressure Gradient sensors?
4. Describe in detail about the Operating principle of an electromagnetic velocity sensor
5. Briefly describe about the Triboelectric Detectors.
6. Describe in detail about Optoelectronic Motion Detectors?
7. Describe in detail about PIR Motion Detectors?
8. Describe Rotor , Optical Gyroscopes in detail.
9. Briefly describe about the Gravitational Sensors in Detail
10. Describe in detail about capacitive, piezoelectric and thermal Accelerometer?

Unit IV

PART- A

1. Define the types of Light Detectors?
2. How photoelectric effect is described in a semiconductor.
3. Define NEP?
4. List the characteristics of photodetectors.
5. List out the steps for fabrication of Cds cells.
6. What are the components of noncontact temperature sensor.
7. Give the specifications of Thermopile.
8. List the operating modes of Photodiode?
9. Define the steps in Bolometer?
10. Define Golay cells?
11. Define Radioactivity?
12. What are the properties of Scintillation material?
13. What are the properties of radiation detector?
14. Write down the applications of cooled detectors?
15. What are the factors that are critical in designing the optical components for an optical sensor?

PART-B

1. Describe the working principle of photodiode.
2. Describe the working principle of phototransistor
3. Describe the working principle of photoresistor.
4. Explain the operating principle of Thermal Detectors and its Types
5. Explain the working principle of CCD sensors
6. Explain the working principle of CMOS sensors
7. Explain briefly about the Scintillating Detectors.
8. Describe about operation of Gas Flame detectors in detail.
9. Describe about operation of Bubble Chambers.
10. Explain in detail about the working principle of all Ionization detectors.

Unit V

PART- A

1. How equilibrium and predictive methods differ in Temperature sensor?
2. What are the components of contact temperature sensors?
3. List some temperature reference points?
4. Give some advantages of thermoresistive sensors?
5. Define Thermistors?
6. State Fraden model?
7. State Steinhart–Hart Model?
8. List three basic characteristics for thermistor applications?
9. List some applications of PTC thermistors?
10. State the thermoelectric laws?
11. List some applications of chemical sensors?
12. How chemical sensors are classified?
13. Define Piezoelectric Effect?
14. List several characteristics of chemical sensors?
15. Draw the Cross-section diagram of the parallel-plate capacitor.

PART-B

1. Briefly describe about the direct chemical sensors and its Types.
2. Briefly describe about the complex chemical sensors and its Types.
3. Describe in detail about various Temperature sensors?
4. Discuss the difference between Thermoresistive Sensors and Thermoelectric Contact Sensors?
5. Briefly describe about the Semiconductor Sensors in Detail.
6. Briefly describe about the Acoustic Sensors in Detail.
7. Briefly describe about the Biochemical Sensors in Detail.
8. Describe about the Multisensor Arrays in Detail.
9. Describe in detail about e-noses.
10. Describe in detail about e-tongues.