



**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**  
**Ramapuram Campus**  
**College of Engineering and Technology**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**UNIT 3 QUESTION BANK**  
**18ECO133T -SENSORS AND TRANSDUCERS**

**UNIT III Topics(1-3) MCQ**

1. \_\_\_\_\_ measures temperature by correlating the resistance of the RTD with temperature.

- a) Thermistor
- b) Resistance Thermometer
- c) Thermo couple
- d) Semiconductor based sensor

Answer: b

2. \_\_\_\_\_ consists of two different metals connected at two points.

- a) Thermistor
- b) Resistance Thermometer
- c) Thermocouple
- d) Semiconductor based sensor

Answer: c

3. Which type of temperature sensor is placed in Integrated Circuits?

- a) Thermistor
- b) Resistance Thermometer
- c) Thermocouple
- d) Semiconductor based sensor

Answer: d

4. Which sensor is linear and low accuracy?

- a) Thermistor
- b) Resistance Thermometer
- c) Thermocouple
- d) Semiconductor based sensor

Answer: d

5. The most rugged temperature sensing element listed here is a/an

- a) Thermistor
- b) Resistance Thermometer
- c) Thermocouple
- d) Semiconductor based sensor

Answer: c

6. Identify the thermocouple type with the highest temperature limit from those listed here:

- a) Type J
- b) Type K
- c) Type S
- d) Type T

Answer: c

7. Reference junction compensation is necessary in thermocouple-based temperature instruments because:

- a) Copper extension wire has a tendency to corrode
- b) Thermocouples are inherently nonlinear
- c) The reference junction generates a temperature-dependent voltage
- d) The junction's electrical resistance varies with temperature

Answer: c

8. A type J thermocouple is made of the following metals:

- a) Aluminum and Tungsten
- b) Iron and Constantan
- c) Platinum and Platinum/Rhodium alloy
- d) Copper and Constantan

Answer: b

9. Most suitable material for a thermocouple is \_\_\_\_\_

- a) brass
- b) gold
- c) platinum
- d) silver

Answer: c

10. For accurate temperature measurement in a thermocouple the \_\_\_\_\_

- a) cold compensation is needed
- b) hot compensation is needed
- c) no compensation is needed
- d) hot and cold compensations are needed

Answer: a

11. ----- is a secondary thermal sensor.

- a) gas thermometer
- b) acoustic type
- c) Magnetic type
- d) Ultrasonic type

Answer: d

12. ----- is a primary thermal sensor.

- a) Quartz crystal thermometer
- b) acoustic type
- c) Thermoemf type
- d) Ultrasonic type

Answer: b

13. what is the temperature range of creosote thermometric liquid in terms of degree Celsius?

- a) 5 to 200 degrees Celsius
- b) 10 to 20 degrees Celsius
- c) 100 to 300 degrees Celsius
- d) 80 to 100 degrees Celsius

Answer: a

14. what is the temperature range of toluene thermometric liquid in terms of degree Celsius?

- a) 5 to 200 degrees Celsius
- b) 10 to 20 degrees Celsius
- c) 100 to 300 degrees Celsius
- d) 80 to 100 degrees Celsius

Answer: d

15. Thermoelectric transducer is a \_\_\_\_\_

- a) temperature transducer
- b) pressure transducer
- c) inductive transducer
- d) capacitive transducer

Answer: a

16. Commonly used thermoelectric transducer is \_\_\_\_\_

- a) thermometer
- b) thermocouple
- c) linear variable differential transducer
- d) loud speaker

Answer: b

17. The algebraic sum of e.m.f.s in a circuit containing thermocouples is \_\_\_\_\_

- a) infinite
- b) hundred
- c) zero
- d) ten

Answer: c

18. What is a thermopile?

- a) single thermocouple
- b) series-parallel connection of thermocouples
- c) parallel connection of thermocouples
- d) series of thermocouples

Answer: d

19. Thermocouple must provide \_\_\_\_\_

- a) small thermo e.m.f
- b) sufficient thermo e.m.f
- c) no thermo e.m.f
- d) infinite thermo e.m.f

Answer: b

20. Which of the following should satisfy for measuring higher temperatures using a thermocouple?

- a) no wire is required
- b) wire must be small
- c) wire must be thin
- d) wire must be heavy

Answer: d

21. The precious metal type of thermocouple sensors are usually identified as

- a) E, I, K, N, and T
- b) A, B, C, and D
- c) D, B, R and S.
- d) R, S, T, and U

Answer: c

22. The base metal type of thermocouple sensors are usually identified as

- a) E, I, K, N, and T
- b) A, B, C, and D
- c) D, B, R and S.
- d) R, S, T, and U

Answer: a

23. Thermocouple is a \_\_\_\_\_

- a) Primary device
- b) Secondary transducer
- c) Tertiary transducer
- d) None of the mentioned

Answer: a

24. Operation of thermocouple is governed by \_\_\_\_\_

- a) Peltier effect
- b) Seebeck effect
- c) Thomson effect
- d) All of the mentioned

Answer: d

25. \_\_\_\_\_ describes current flow between two junctions formed by two different metals.

- a) Peltier effect
- b) Thomson effect
- c) Seebeck effect
- d) None of the mentioned

Answer: a

26. Amount of heat liberated or absorbed when 1A current passes is called \_\_\_\_\_

- a) Thomson coefficient
- b) Peltier coefficient
- c) Seebeck coefficient
- d) None of the mentioned

Answer: b

27. Total Seebeck effect can be found as \_\_\_\_\_

- a) Total Peltier effect
- b) Total Thomson effect
- c) Partly Peltier and partly Thomson effect
- d) None of the mentioned

Answer: c

28. Which of the following element is used as a thermocouple in nuclear reactor?

- a) Boron
- b) Platinum
- c) Copper
- d) Iron

Answer: a

29. \_\_\_\_\_ can be used as a replacement for thermocouple lead.

- a) Replacement lead
- b) Replica lead
- c) Compensating lead
- d) None of the mentioned

Answer: c

30. Thermo couple cannot be used to measure \_\_\_\_\_

- a) Temperature of gas
- b) Temperature of liquid
- c) IR radiation
- d) None of the above

Answer: d

### Sensors and Transducers Unit III MCQ for topic 4,5 and 6.

1. Semiconductor used in sensors will be \_\_\_\_\_
  - a) Pure form
  - b) Doped form
  - c) Pure or doped form**
  - d) None of the mentioned
2. A semiconductor can act as \_\_\_\_\_
  - a) Insulator
  - b) Semi conductor
  - c) Pure conductor
  - d) All of the mentioned**
3. Which of the following act as magneto-resistive material?
  - a) Bismuth
  - b) Antimonide
  - c) Both bismuth and antimonide**
  - d) None of the mentioned
4. Reference temperature is \_\_\_\_\_
  - a) Cold junction temperature above 0 degree.**
  - b) Cold junction temperature above 30 degree.
  - c) Cold junction temperature above 60 degree.
  - d) Cold junction temperature above 90 degree.
5. Loss in thermo emf sensor is due to \_\_\_\_\_
  - a) Low reference junction temperature
  - b) High reference junction temperature**
  - c) Medium reference junction temperature
  - d) No reference temperature
6. Recently \_\_\_\_\_ temperature sensor is used to correct the temperature.
  - a) PTR 450
  - b) PTR 200
  - c) PTR 100**
  - d) PTR 300
7. Temperature is corrected in sensor using the following formula
  - a)  $t_c = t_M + K t_R$**
  - b)  $t_c = t_M - K t_R$
  - c)  $t_c = t_M * K t_R$
  - d)  $t_c = t_M / K t_R$
8. Thermocouple with very long wire and high resistance leads to \_\_\_\_\_
  - a) Increased cost and difficulty in handling**
  - b) Reduced cost and easy to handle
  - c) Increased cost and easy to handle
  - d) Reduced cost and difficulty in handling
9. Semiconductor devices are used to manufacture the thermal sensors because of \_\_\_\_\_
  - a) Electrical effect
  - b) Magnetic effect
  - c) Thermal effect**
  - d) mechanical effect
10. Mathematically Seebeck effect is given by
  - a)  $\Delta E = \alpha_s / \Delta T$**
  - b)  $\Delta E = \alpha_s - \Delta T$
  - c)  $\Delta E = \alpha_s + \Delta T$

**d)  $\Delta E = \alpha_s \Delta T$**

11.  $\alpha_s$  depends on \_\_\_\_\_

- a) Fermi Energy
- b) Conduction band energy
- c) Electron or hole density

**d) All of the above**

12. Thermopiles consist of serially connected \_\_\_\_\_

**a) Si – Al**

b) Si- Ba

c) Si-Ti

d) Si- Fe

13.  $\alpha_s$  vary from \_\_\_\_\_ depending upon the IC fabrication and materials.

a) 250-1290 microvolt/Kelvin

**b) 250-1200 microvolt/Kelvin**

c) 250 -1300 microvolt/Kelvin

d) 250-1250 microvolt/Kelvin

14. Pyroelectric thermal sensor comprises of \_\_\_\_\_ material.

a) Ferromagnetic

b) Ferromechanical

**c) Ferroelectrical**

d) Ferro ceramic

15. \_\_\_\_\_ property raises spontaneous electric polarization on a polar axis in pyroelectric thermal sensor.

a) Ferromagnetic

b) Ferromechanical

**c) Ferroelectrical**

d) Ferro ceramic

16. The direction of polarization in pyroelectric thermal sensor can be changed by applying \_\_\_\_\_

a) Magnetic field

**b) Electric field**

c) Potential difference

d) current difference

17. Pyroelectricity property states that \_\_\_\_\_

**a) Electric polarization with temperature**

b) Electric polarization with pressure

c) Electric polarization with force

d) Electric polarization with magnetic field

18. The most popularly used pyroelectricity material is \_\_\_\_\_

a) Fe

b) Al

**c) Ceramics**

d) Si

19. If the temperature is raised above Curie point, \_\_\_\_\_ in the dipoles are free to rotate.

a) Ions

**b) Molecules**

c) Electrons

d) Protons

20. The molecules in the pyroelectric material are arranged in the direction \_\_\_\_\_ to applied electric field.

a) Serial

**b) Parallel**

c) Perpendicular

d) Straight

21. In pyroelectric material, the polarization is \_\_\_\_\_ to applied electric field.

**a) Directly proportional to**

b) Indirectly proportional to

c) Equal to

d) Not equal to

22. The electric moment in the dipole is expressed as \_\_\_\_\_

a)  $m = q/l$

**b)  $m = ql$**

c)  $m = q+l$

d)  $m = q-l$

23. If the dipole oscillates with an average angle  $\theta$ , the effective length is given by,

**a)  $l_e = l \cos \theta$**

b)  $l_e = l \sin \theta$

c)  $l_e = l \tan \theta$

d)  $l_e = l \cos \theta$

24. The magnetic moment of entire ceramic slice when it is placed between two electrodes is given by \_\_\_\_\_

**a)  $M = P_v A T_K$**

b)  $M = P_v K T_K$

c)  $M = P_v B T_K$

d)  $M = P_v U T_K$

25. Spectral response of pyroelectric sensor is given by \_\_\_\_\_

a) 0.001- 1000 nanometer

**b) 0.001- 1000 micrometer**

c) 0.001- 1000 meter

d) 0.001- 1000 centimeter

26. Most frequently used materials as temperature sensors are \_\_\_\_\_

**a)  $\text{LiTaO}_3$**

b)  $\text{LiTaO}_2$

c)  $\text{LiTaO}_4$

d)  $\text{LiTaO}_3$

27. The pyroelectric materials are classified based on \_\_\_\_\_

a) Pyroelectricity

b) Coupling coefficient

**c) Figure of merit**

d) Dielectric loss.

28. If we remove the applied electric field across the pyroelectric material, then \_\_\_\_\_

a) Electrical field changes its direction

**b) Electrical field retains**

c) Electrical field removed

d) Electrical field becomes negative.

29. Materials with \_\_\_\_\_ symmetry will exhibit pyroelectricity property.

a) Rectangular point

**b) Polar point**

c) Cartesian point

d) Triangular point

30. The permanent dipoles in the pyroelectric materials oscillates about their\_\_\_\_\_orientation.

a) Perpendicular

**b) Parallel**

c) Series

d)Horizontal

### **PART B**

1. Write notes on the characteristics of radiation sensors?
2. List the factors to be considered for the choice of thermo-emf materials.
3. Write short notes on Acoustics temperature sensors?
4. What are the materials used for thermo-emf sensors?
5. Give some applications of Pyroelectric thermal sensors?
6. Define Peltier and Seebeck effect?
7. Give some applications of Radiation sensors?
8. Write short notes on Thermal sensors?
9. Discuss about Scintillation detectors?

### **Part C**

- 1) Explain thermocouple sensor? State the Laws associated with it, along with the Construction and working.
- 2) Explain the construction and working of Gieger-Muller Radiation Sensor with a neat diagram.
- 3) Identify and explain the construction, working about an instrument used for detecting and measuring ionizing radiation. Write also about its types with applications.
- 4) Explain the construction and working of semiconductor based sensors for measuring temperature.
- 5) Write short notes about various types of thermocouple based on material used and temperature of operation.
- 6) How pyroelectric thermal sensors works. Explain the underlying principle of operation.
- 7) Explain about scintillation detectors with a neat diagram and give its applications.
- 8) Discuss in detail about the thermal expansion type thermometric sensors.