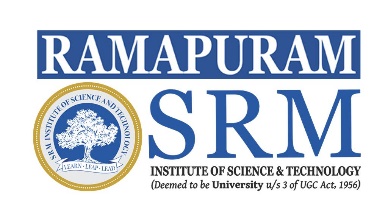
** SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**Ramapuram Campus**

**Faculty of Engineering and Technology**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**UNIT 2 & 3 QUESTION BANK**

**Sub. Code: 18ECO133T**

**Sub. Name: SENSORS AND TRANSDUCERS**

**Year/ Sem: III/ V and IV/VII**

**MULTIPLE CHOICE QUESTIONS**

1. Self-inductance depends on \_\_\_\_\_\_\_\_
2. permeability b) permittivity c) plank’s constant d) rydberg constant
3. Synchro is a rotating device that operates on the same principle as a\_\_\_\_\_\_\_\_and produces a set of voltages, correlated to angular position.

a)Transformer principle b)Faradays principle c) Lens law d) Tesla principle

1. For measuring the magnitude as well as direction of displacement using LVDT,it is used in conjunction with \_\_\_\_\_\_\_\_

a)Amplitude modulator with LPF b)Phase sensitive demodulator followed by LPF c) Twin T network d)integrator

1. Which of the following represents correct conversion for magnetostrictive transducers?
2. Mechanical energy to magnetic energy b) Mechanical energy to electrical energy

c) Magnetic energy to electrical energy d) Mechanical energy to acoustic energy

1. Magnetostrictive transducer can be used to measure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Force b) Acceleration c) Torque d) All of the mentioned
3. )In the inductive transducer, the variation of inductance can often be measured by \_\_\_\_\_\_\_\_circuits
4. Wheatstone Bridge b) Kelvin bridge c)AC bridge d)DC bridge
5. In synchros the stator with windings S1,S2 and S3 are separated by \_\_\_\_\_\_\_\_degree in space

a)120 b)30 c)45 d)90

1. In synchros the error voltage is\_\_\_\_\_\_\_\_
2. proportional to the angular rotational difference of the rotors b) proportional to the angular rotational difference of the stators c) inversely proportional to the angular rotational difference of the rotors d)inversely proportional to the angular rotational difference of the stators
3. The fringing effects in capacitors can be reduced by \_\_\_\_\_\_\_\_
4. using guard ring b) increasing the edge length c)increasing the side area of electrodes d)increasing the plate length

10) Piezoelectric transducer consists of\_\_\_\_\_\_\_\_

1. copper rod b) aluminum wire c) gold crystal d) quartz crystal

11) Which of the following transducers measures the pressure by producing emf as a function of its deformation?

1. Photoelectric transducer b) Capacitive transducer c) Inductive transducer d) Piezoelectric transducer

12) The wavelength of ultrasonic waves is -----

1. more than audible sound b) less than audible sound c) equal to audible sound d) greater than light wave

13) In a variable capacitor, the dielectric material is generally----

1. mica b) air c) ceramic d) electrolyte

14) Piezoelectric transducers are \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Passive transducers b) Inverse transducers c) Digital transducers d) Pulse transducers

15)The self-inductance L of the coil is given by ------

1. nBa/I b)2nBa/I c)nBa/2I d)nBaI

16)Among the following sensing element, identify the most rugged temperature sensing element

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

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

a) TypeJ   b)Type K c)Type S d) Type T

18) 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

19) From the sensors listed below, which of the following is not a type of radiation detectors?  
a) Geiger Muller counter b) Proportional counter c) Semiconductor detector  
d) Flame emission detector

20) Which of the following acts as quenching gas in Geiger Muller counter?  
a) Alcohol b) Argon gas c) Krypton d) Hydrogen

21) 7. Which of the following is the main disadvantage of solid state semiconductor detector?  
a) Low accuracy b) Low sensitivity c) It should be maintained at low temperature  
d) High pressure has to be produced

22) Commonly used thermoelectric transducer is \_\_\_\_\_\_\_\_\_\_  
a) thermometer b) thermocouple c) linear variable differential transducer  
d) loud speaker

23) The algebraic sum of e.m.f.s in a circuit containing thermocouples is \_\_\_\_\_\_\_\_\_\_  
a) infinite b) hundred c) zero d) ten

24) 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

25) Most suitable material for a thermocouple is \_\_\_\_\_\_\_\_  
a) brass b) gold c) platinum d) silver

26) Output of a bimetallic element will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Strain b) Pressure c) Displacement d) Voltage

27) Which of the following is used as indication instrument in a liquid expansion system?  
a) Bellows b) Bourdon tube c) Ammeter d) Thermometer

28) Operation of thermocouple is governed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Peltier effect b) Seebeck effect c) Thomson effect d) All of the mentioned

29) 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

30) 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

1. Mutual inductance between two coils is given as \_\_\_\_\_\_\_\_\_
2. M=K
3. M=K
4. M=K
5. M=
6. A linear transfer function is also called as

a)System transfer function

b)Component transfer funcion

c) Constant transfer function

d)Both a and c

1. In electromagnetic based transduction measurand is \_\_\_\_\_\_\_\_\_\_\_
2. converted into mechanical force
3. converted into electromotive force
4. converted into chemical force
5. converted into physical force

34. Magnetostrictive transducer can be used to measure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Force b) Acceleration c) Torque d) All of the mentioned

35.Which of the following represents correct expression for sensitivity in a magnetostrictive transducer?  
a) ΔB b) ΔB/σ c) σ d) σ/ΔB

36. Which of the following represents materials used for thickness measurement using inductive transducer?  
a) Material should be magnetic in nature  
b) Material should be magnetic and conducting  
c) Material should be magnetic and non-conducting  
d) All of the mentioned

37) **In a LVDT, the two secondary voltages**

a) Are independent of the core position  
b) Vary unequally depending on the core position  
c) Vary equally depending on the core position  
d) Are always in phase quadrature

38. What are the two general classifications of synchro systems?

a)Torque and control b)Load and control c)Load and lock d)Torque and load

39. Frequency response of capacitive transducers is \_\_\_\_\_\_\_\_  
a) high b) medium c) low ) zero

40) Composite capacitance consists of \_\_\_\_\_\_\_\_\_  
a) one dielectric medium  
b) more than one dielectric medium  
c) five dielectric media  
d) ten dielectric media

41) Capacitance sensor can measure very small displacement. It can be formed by varying  
a. Separation b. Area c. Permittivity d. Either (a) or (b) or (c)

42) Which of the following is the correct expression for Piezoelectric effect?  
a) P = Zd + E b) P = Zd + εoE c) P = Zd + εoχE d) P = Zd + dεoχE

43) Basically sound waves are \_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Voltage signals b) Pressure waves c) Current d) Radiation

44) During the measurement of voltage, the voltmeter responded with a 0.18 V change when the input was varied by 0.2 V. Find the sensitivity of the instrument.

1. 0.9 b) 0.18 c) 0.1 d) 0.2

45) Which of the following can not travel through a vacuum?

a) Electromagnetic wave b) Radio wave c) Sound wave d) Light wave

46) Sound wave has two main characteristics which are

a. Highness and loudness b. Tone and loudness c. Pitch and loudness d. Rarefaction and compression

47) Which type of temperature sensor is placed in Integrated Circuits?

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

48) Which of the following element is used as a thermocouple in nuclear reactor?  
a) Boron b) Platinum c) Copper d) Iron

49) ……….. produced in the thermocouple due to difference of junction temperature

a) E.M.F b) Current c) Resistance d) both a&b are correct

50) Pyroelectric detectors are specifically used for detecting electromagnetic radiation in a wavelength range from   
a) 2 to 14µm b) 2 to 12µm c) 2 to 10µm d) 2 to 8µm

51) Applications of Pyroelectric sensors?  
a) Pollution detector b) Position sensor c) Solar cell studies d) all the above

52) Which of the following acts as quenching gas in Geiger Muller counter?  
a) Alcohol b) Argon gas c) Krypton d) Hydrogen

53) When nuclear radiations pass through, gas ionization is produced. This is the principle of which of the following detectors?  
a) Proportional counter b) Flow counter c) Geiger Muller counter d) Scintillation counter

53) Scintillation detector is a large flat crystal of which of the following materials?  
a) Sodium chloride b) Sodium iodide c) Sodium sulphate d) Sodium carbonate

54) How many types of radiation sensors are available

a) 2 b) 3 c) 4 d) 5

55) Identify the material used for Type T thermocouple is \_\_\_\_\_\_\_\_  
a) Nickel-Chromium / Nickel-Alumel b) Iron/Constantan c) Copper/Constantan d) Nickel-Chromium/Constantan

56) Thermal expansion coefficient in terms of linear expansion is given by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) b) c) d)

57) Which of the following equation relates the frequency, temperature and tension ‘σ’ in the wire  
a) f = 1/2 [σ/ρ] / 2l Hz b) f = 1/2 [σg/2ρ] / 2l Hz c) f = 1/2 [σg/ρ] / 2l Hz d) f = 2 [σg/ρ] / 2l Hz

58) Major characteristics of semiconductor thermosensors include: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Linear output b) Moderately small sizes c) Not capable enough to measure high temperatures d) All of the mentioned

59) Semiconductor based thermal sensors exhibit the slowest responsiveness ……………….across the narrowest temperature range…………….  
a) (5 s to 60 s) , (-70 °C to 150 °C) b) (15 s to 60 s), (-60 °C to 120 °C) c) (-70 °C to 70 °C) ,(5 s to 16 s) d) (-70 °C to 140 °C) ,(10 s to 20 s)

60) Radiation sensors are widely used in   
a) medical applications for image generation b) high-energy physics experiments c) airports security d) All the above

**IMPORTANT TOPICS**

1) What is meant by LVDT and explain its working .

2) Write short notes on construction and working of synchros

3) How is the temperature difference measured via a **thermocouple** sensor? State the Laws associated with it, along with the Construction and working.

4) Explain the construction and working of Gieger-Muller Radiation Sensor.

5) Explain the effect of thickness in working of capacitive transducers with necessary equation and diagram. Also compare the same with normal capacitive transducer.

6) Write short notes about working of ultrasonic sensor using appropriate diagram. Also compute the sensitivity of the device with characteristics.

7) Identify and explain the construction, working about an instrument used for detecting and measuring ionizing radiation. Write also about its types with applications.

8) Explain the construction and working of semiconductor based sensors for measuring temperature.

9)Write short notes about various types of thermocouple based on material used and temperature of operation.

10) How pyroelectric thermal sensors works.Explain the underlying principle of operation.

11) write short note about scintillation detectors.

12) Explain the classification of inductive sensors .