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ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc. ELECTRONICS– V SEMESTER
SEMESTER EXAMINATION: NOVEMBER/DECEMBER 2020
EL 5118 – DATA AQUISITION & INSTRUMENTATION

Time- 2 ½ hrs **Max Marks-70**

This paper contains TWO printed pages and THREE parts

PART-A

Answer any **FIVE** questions. **5×8=40**

1 a) Explain the parameters of electrical transducer.
b) Explain the construction and working of resistance thermometer. (4+4)

2 a) Give the types of thermocouple and explain the Seebeck effect.
b) Give the construction of Reluctance transducer. (4+4)

3 a) Explain the working of LVDT.
b) Explain the single channel DAS block diagram. (4+4)

4 a) Explain the Successive Approximation method of ADC.
b) Explain the ramp type digital voltmeter. (4+4)

5 a) Explain the block diagram of DVM.
b) Give the block diagram of IC 8038 signal generator and explain briefly. (4+4)

6 a) Give the block description of analog dual trace oscilloscope.
b) Explain the working mechanism of OLED display. (4+4)

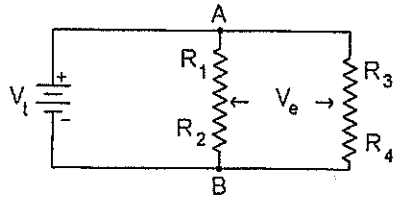
7 a) Mention the types of touch screens and explain any one of them.
b) Explain the instrumentation amplifier. (4+4)

PART-B

Answer any **FIVE** questions. **5×4=20**

8. A resistive strain gauge with a gauge factor of 2 cemented to a steel member, which is subjected to a strain 1×10^{-6}. If the original resistance value of the gauge is 130Ω, calculate the change in resistance.

9. A resistive transducer with a resistance of 5 k Ω and a shaft stroke of 3.0 in. is used in the arrangement in fig. Potentiometer R3 – R4 is also 5 kΩ and Vt is 5 v. The initial position to be used as a reference point is such that R1 = R2 (i.e. the shaft is at the centre.) At the start of the test potentiometer R 3- R4 is adjusted s that the bridge is balanced (Ve = 0). Assuming that the object being monitored moves a maximum resistance of 0.5 in. towards A, what will be the new value of Ve? (Shaft distance is 5 in.)



10. An ac LVDT has the following data. Input= 6.3 v, output= 5.2 v, range ± 0.5 in. Determine (i) the output voltage Vs core position for core movement going from +0.45 in to - 0.30 in (ii)the output voltage when the core is - 0.25 in from the center.

11. A 4-bit DAC has the full scale voltage of 5 v. Calculate the % of resolution. How many bits are required to obtain a resolution of 2% for same full scale voltage?

12. An ADC has the following characteristics, resolution of 12 bits, full scale error of 0.03%, and full scale input of 5V. What is the quantization error in volts? What is the total possible error in volts.

13. A 4 ½ digit voltmeter is used for voltage measurements. (a) Find its resolution (b)How would 12.98V be displayed on 10V range? (c)How would 0.6973 be displayed on 1V range? d) How would 0.6973 be displayed on 10V range?

14. Determine the frequency of the vertical input in the following cases for the Lissajous pattern on an CRO with (i) five horizontal and two vertical tangencies (ii) two horizontal and five vertical tangencies, where the frequency of the horizontal input is 1000Hz.

PART-C

Answer any **FIVE** questions. **5×2=10**

15. Mention the types of errors in a transducer.
16. What is the material used in the construction of thermistor.
17. Mention the self generating transducer with one typical application.
18. What are the basic elements of a signal conditioning objectives of a data acquisition system.
19. Mention the two methods of analog to digital converters.
20. Which is the important characteristic of a voltmeter? Mention its unit.
21. Define Aspect ratio? What is its significance.
