

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code:151702

Subject Name: Sensors and Signal conditioning

Date:16 /12 /2010

Time: 03.00 pm - 05.30 pm

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**

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| Q.1 | (a) | (i) Differentiate terms with example
1) Accuracy and Precision 2) Span and Range | 04 |
| | | (ii) Explain the techniques of Pulse code Modulation & their merits | 03 |
| | (b) | What is the instrumentation amplifier and its special role in instrumentation?.
Draw the scheme of connection and derive the expression for its gain. | 07 |
| Q.2 | (a) | Explain Briefly the techniques adopted for measurement of time interval, showing how it is indicated | 07 |
| | (b) | (i) What are the important characteristics of an operational amplifier | 03 |
| | | (ii) Discuss the basic difference in the performance of analog and digital voltmeter and indicate the merits of digital indication | 03 |
| | | (iii) What is a differential amplifier | 01 |
| | | OR | |
| Q.2 | (b) | (i) What is isolation amplifier? discuss application in instrumentation | 03 |
| | | (ii) What is electrometer amplifier and what is its special application | 03 |
| | | (iii) Define given terms 1) Reproducibility
2) Repeatability | 01 |
| Q.3 | (a) | Describe the construction and operation of a thermal conductivity gauge and show that it can be used for analysis binary mixtures | 07 |
| | (b) | Describe the construction features of a linear variable differential transformer and comment in its merits and discuss the limiting factor bandwidth and sensitivity | 07 |
| | | OR | |
| Q.3 | (a) | Show how capacitive transducers can be used to monitor the thickness of insulating sheer in motion, without making physical contact and discuss on the sensitivity and linearity of the system | 07 |
| | (b) | Define photo resistive effect and mention the material that exhibits this effect. Discuss its application potential in instrumentation | 07 |
| Q.4 | (a) | Show how piezo electric transducer can be used to measure
1)pressure 2) torque and describe the constructional features of such system | 07 |
| | (b) | (i) Distinguish between photovoltaic, photo emissive and photo conductive cell | 03 |
| | | (ii) Explain in detail PH measurement with necessary figures | 04 |
| | | OR | |
| Q.4 | (a) | Describe the construction features of magnetostrictive transducer and obtain input and output relationship with application | 07 |
| | (b) | Describe the construction features of dc tachometer and an ac tachometer and distinguish their performance characteristics | 07 |

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| Q.5 | (a) | (i) Describe wein bridge oscillator and explain its importance in instrumentation | 04 |
| | | (ii) Explain the operation of multiplexing and demultiplexing and indicate their application in instrumentation | 03 |
| | (b) | (i) Explain the classification of the standards | 04 |
| | | (ii) Draw the block diagram of data logger and indicate the function of each stage. | 03 |
| | | OR | |
| Q.5 | (a) | (i) Draw the simple circuit of Schmitt trigger and its application | 03 |
| | | (ii) Explain in detail voltage to frequency converter | 04 |
| | (b) | (i) Explain in detail measurement of moisture content in wood using capacitive transducer | 04 |
| | | (ii) Explain in detail types of strain gauge | 03 |
