

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-V Examination-Nov/Dec.-2011

Subject code: 151702

Date: 26/11/2011

Subject Name: Sensors and Signal conditioning

Time: 2.30 pm -5.00 pm

Total marks: 70

Instructions:

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

- Q.1** (a) (1) Distinguish between analog indicator and digital indicator systems and discuss the merits of each **03**
(2) what are the line spectra of signal and how are they represented **03**
(3) what is a thermal converter **01**
(b) Draw the circuit of charge amplifier and how it enables measurement of electrical charge, obtain the relationship between charge and output and discuss its limitation **07**

- Q.2** (a) (1) What is an electrometer amplifier and what is its special application **03**
(2) Describe a bolometer, what does it measure **02**
(3) what is a thermopile and its application **02**
(b) (1) Indicate the basic characteristics of an operational amplifier and show how it has enabled the processing of measured data obtained from transducer **03**
(2) indicate the merits of frequency modulation with compared to analog modulation **02**
(3) Draw the circuit of amplitude demodulator **02**

OR

- (b) (1) Briefly describe the following types of oscillator (any two and explain their importance in instrumentation system **04**
(I) Wien bridge oscillator
(II) Crystal oscillator
(III) LC – tuned circuit oscillator
(2) what is the difference between a voltage controlled oscillator and voltage to frequency counter **03**

- Q.3** (a) What are data acquisition systems and what is their role in the field of instrumentation with necessary block diagram **07**
(b) Briefly describe the type of printer used for the print out of data in digital form **07**

OR

- Q.3** (a) Explain the operation of multiplexing and demultiplexing and indicate their application **07**
(b) What is meant by cold junction compensation and how is it effected in industrial environment **07**

- Q.4** (a) Distinguish between piezoelectric material and ferroelectric material, mention some of the important ferroelectric material and their **07**

- application in instrumentation
- (b) Explain Hall effect and suggest its application **07**
- OR**
- Q.4** (a) Describe the construction features of a magnetostrictive transducer and obtain the input output relationship **07**
- (b) Explain the principle of operation of electromagnetic flow meter and suggest the nature **07**
- Q.5** (a) Discuss the field of application of strain gauge the situation In which they are most suited for used **07**
- (b) What are conductivity cells and how do they enable measurement of concentration of electrolytic solution **07**
- OR**
- Q.5** (a) Describe the design features of capacitive pressure transducer and obtain expressions relating the capacitance variation with pressure for the cases (a) thin plate diaphragm and (b) metal coated membrane **07**
- (b) Explain why inductive transducer are mostly iron cored suggest the important consideration to be applied while designing and using them **07**
