

6. Attempt any two parts of the following : (10×2=20)

(For Branch Textile/TT) (Branch Code 61)

- Explain the Textile Instrumentation and Colorimeter.
- Write the working principle of stroboscope and nep counting.
- Explain the Instrumentation for computer Color matching.
- Explain the functioning of tension meters.

6. Attempt any two parts of the following : (10×2=20)

(For Branches CE/AG) (Branch Code 00/80)

- Discuss why frequency telemetry is considered superior to voltage or current telemetry, even in short distance cases.
- Draw the block diagram of a complete telemetry scheme using frequency division multiplexing and de-multiplexing.
- Write a short note on radio frequency telemetry.
- Draw a schematic arrangement to show that PWM and PPM can be obtained from PAM signals.

6. Write short notes on any two of the following : (10×2=20)

(For Branch Env) (Branch Code 97)

- Application and Monitoring of Sensor in Environmental Analysis.
- Ionic chromatography for analysis of inorganic ions in water.
- Infrared absorption Spectroscopy.
- Nano Sensors.

6. Attempt any two parts of the following : (10×2=20)

(For Branch CHE) (Branch Code 51)

- What are the different types of monometers ? Explain the working of any one of them with a neat sketch.
- Explain the principle, construction and working of McLeod gauge.
- Write short note on any one of the following :
  - Pirani Gauge
  - Optical Pyrometers.
- Describe thermal dying method of moisture measurement.

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EE305

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1256 Roll No. 

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**B.Tech.**

(SEM. III) ODD SEMESTER THEORY

EXAMINATION 2013-14

**SENSOR AND INSTRUMENTATION**

Time : 3 Hours

Total Marks : 100

Note :- Question No. 1 to 5 are compulsory for students of all branches. Question No. 6 is branch specific and students are advised to attempt the part specific to their branch.

**SECTION-A**

1. Attempt all parts. All parts carry equal marks.

(10×2=20)

- What is the concept of Smart Sensor? Where can they be used ?
- Enlist the classification of errors.
- Define the working principle of K type thermocouple.
- Differentiate between sensor and transducer.
- Why active filters are preferred over passive filters ?
- Define semiconductor strain gauge with its applications.
- Give the classification of Display device.
- What do you mean by Virtual Instrumentation System ?
- Differentiate between Modulation and Modulation Index.
- Differentiate between Accuracy and Precision with suitable example.

## SECTION-B

2. Attempt any **three** parts of the following : (3×10=30)
- Discuss the working principle of LVDT with the help of neat sketch and characteristic. Explain the advantages and disadvantages of LVDT.
  - Explain the R/2R Ladder techniques for converting the signal from digital to analog converter.
    - Draw a Sample/Hold (S/H) circuit.
  - Draw the circuit diagram of inverting operational amplifier. Derive the expression for voltage gain.
    - With the help of neat circuit diagram, explain the operation of voltage to frequency converter.
  - Explain all the basic components of a data acquisition system.
    - Discuss the Basic principle of Digital telemetry.
  - Explain the working of Electromagnetic flowmeter and Ultrasonic flowmeter in brief.

## SECTION-C

**Note :-** All questions are compulsory. (50 marks)

3. Attempt any **two** parts of the following : (5×2=10)
- Draw the circuit diagram of a first order low pass filter and derive its transfer function.
  - Explain the working of strip chart recorder.
  - Explain the working of envelop detector with circuit diagram.
4. Attempt any **two** parts of the following : (5×2=10)
- Explain the operation of thermocouple sensor for the measurement of temperature.
  - Draw the circuit diagram of inverting operational amplifier. Derive the expression for voltage gain.

- Explain the working principle of linear potentiometric displacement sensor and derive the expression for output voltage.
5. Attempt any **two** parts of the following : (5×2=10)
- Explain the feature of Lab VIEW and how it can be used to measure the input signal.
  - Determine the convolution of two discrete time signal given by  $x_1[n] = \{1, 2, 3, 4\}$  and  $x_2[n] = \{2, 4, 6, 8\}$ .
- (c) Explain the principle and working of a strain gauge and prove  $G_F = 1 + 2g + \frac{\Delta\rho/\rho}{\epsilon}$  where  $g$  is Poisson ratio,  $\rho$  is resistivity of material and  $\epsilon$  is strain.

**Note :-** In Question No. 6, attempt only the question specific to your branch.

6. Attempt any **two** parts of the following : (10×2=20)  
(For Branches CS/IT/EC/EI/IC/EE)  
(Branch Code 10/13/30/31/33)
- Derive the balance equation for Anderson's Bridge. Draw its circuit diagram with phasor diagram.
  - Draw a block diagram for spectrum analyzer and explain each function in detail.
  - For Q meter circuit is in resonance  $E = 100$  mv,  $R = 5 \Omega$  and  $X_L = X_C = 100 \Omega$ .
    - Calculate the coil Q and voltmeter indication
    - Determine the Q factor and voltmeter indication for another coil that  $R = 10 \Omega$  and  $X_L = 100 \Omega$  at resonance.
  - A basic D' Arsonval movement with resistance of  $50 \Omega$  and a full scale deflection current of  $2$  mA is to be used as a multi range voltage meter. Design the series string of multimeter to obtain the voltage range of  $0-10V$ ,  $0-50V$ ,  $0-100V$  and  $0-500V$ .