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**EE 131704 NR**

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**B.Tech. 7<sup>th</sup> Semester End-Term Examination**

**EE**

**MODERN INSTRUMENTATION ENGINEERING**

**(New Regulation)**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

**PART A**

Multiple choice questions.

Answer ALL the questions from this part.

(10 × 1 = 10)

1. (i) The difference between the measured value and the true value is called
  - (a) Relative error
  - (b) Absolute error
  - (c) Probable error
  - (d) Gross error
- (ii) Capacitive transducers are normally employed for \_\_\_\_\_ measurements
  - (a) Dynamic
  - (b) Static
  - (c) Both static and dynamic
  - (d) Transient
- (iii) Which of the following is TRUE for an OPAMP?
  - (a) Low input resistance
  - (b) Very high output resistance
  - (c) Very high input resistance
  - (d) Low open circuit voltage gain
- (iv) Which of the following is digital transducer?
  - (a) Piezo electric transducer
  - (b) Encoder
  - (c) Photovoltaic
  - (d) Thermocouple
- (v) Which of the following represents telemetry?
  - (a) Fetching data from inaccessible point
  - (b) Fetching data from accessible point
  - (c) Communication over telephone
  - (d) None of the mentioned

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- (vi) Which of the following mode of signals cannot be transmitted using telemetry?
- (a) Audio (b) Visual  
(c) Pictures (d) None of the mentioned
- (vii) Op-Amp is abbreviated as \_\_\_\_\_.
- (a) Operational Amplifier (b) Operand amplitude  
(c) Operational amplitude (d) None of the above
- (viii) Op-Amp performs which type of mathematical type operations.
- (a) Linear (b) Non-linear  
(c) Frequency-dependent (d) All the above
- (ix) Which of the following represent active transducer?
- (a) Strain gauge (b) Thermistor  
(c) LVDT (d) Thermocouple
- (x) Potentiometer transducers are used for the measurement of
- (a) Pressure (b) Displacement  
(c) Humidity (d) Both (a) and (b)

#### PART B

Answer any four questions for this part.

(4 × 15 = 60)

2. (a) Draw the block diagram of a generalised measurement system and explain each block. (10)
- (b) What are the different methods of measurement? (5)
3. (a) Explain the working of a resistive potentiometer with diagram. (5)
- (b) A linear resistive potentiometer is 50mm long and is uniformly wound with a wire having a resistance of 10KΩ. Under normal conditions the slider is at the centre of the potentiometer. Find the linear displacement when the resistance from the potentiometer is measured at-
- (i) 3850Ω
- (ii) 7560Ω (5)
- (c) What are the different types of strain gauges? Explain any one type. (5)

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4. (a) Explain the working of digital shaft encoder (5)  
(b) Write in brief about synchro error detector (5)  
(c) Write short note on Bourdon tube. (5)
5. (a) Write short notes on : (5 + 5)  
(i) Dc servo motor  
(ii) AC servomotor
- (b) An analog transducer with a 0-10 V input is able to distinguish a change of 10 mV in its input per day  
(i) Calculate the resolution of the analog transducer  
(ii) Calculate the number of bits of an analog to digital converter such that the digital output has almost the same resolution as the transducer.  
(iii) Calculate the quantization error. (5)
6. (a) Describe phase modulation. (5)  
(b) Differentiate between noise and drift. (5)  
(c) Draw the block diagram of data transmission and explain each block. (5)
7. (a) Describe the working of load cell with diagram. (5)  
(b) Write short notes on any two : (5 + 5)  
(i) Synchros  
(ii) LVDT  
(iii) Permanent magnet stepper motor

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