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OR

What are Thermocouples? Explain their working principle with a neat diagram? What are the materials normally used in making thermocouples? What are their major advantages? Give their range.

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Total No. of Questions : 5]

[Total No. of Printed Pages : 4

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**EI/IC-405**

**B.E. IV Semester**

Examination, December 2016

**Mechanical Measurements**

*Time : Three Hours*

*Maximum Marks : 70*

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
- ii) All parts of each question are to be attempted at one place.
- iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
- iv) Except numericals, Derivation, Design and Drawing etc.
- v) Draw neat and clean diagram wherever needed.

**Unit - I**

1. a) Define pot. Explain the reasons why d.c. potentiometer cannot be used for a.c. measurement straightaway.
- b) Define Vibration? Write the equation for sinusoidal vibration.
- c) What is a Strain gauge? Explain in detail about different types of strain gauges.
- d) Draw the schematic diagram of seismic transducer and explain its operation both in the displacement mode and acceleration mode.

OR

What is Tachometer? Classified various types of tachometers? Explain how a tachometer helps in measurement of RPM.

### Unit - II

2. a) Define load cell. What are the applications of load cell?
- b) Identify the factors affecting the accuracy of force measurement.
- c) List the different methods of torque measurements and compare the merits of different method.
- d) Describe the properties of material used for piezo-electric transducer. Derive the expression for voltage and charge sensitivities.

OR

Design a strain gauge torsion meter. Discuss the construction, working and advantage of the same.

### Unit - III

3. a) Draw a neat sketch to show the essential parts of a bourdon tube pressure gauge.
- b) What are Bellows? Explain the working of bellow pressure gauges.
- c) Demonstrate how a Dead weight gauge is used to calibrate pressure measuring device.

- d) Describe the basic principle, construction and working of Ionization gauge. Write its advantages and disadvantages, also mention its range.

OR

List different types of microphones. Explain basics of microphone used for sound level measurement.

### Unit - IV

4. a) List the advantages of orifice over venture meter.
- b) Discuss why air purge method is so popular in industrial liquid level measurement.
- c) Illustrate the limitations of ultrasonic flow meter.
- d) Explain with neat sketch, the construction, working, advantages and disadvantages of Laser Doppler Anemometer.

OR

What are the different electrical methods used for measurement of liquid level. Explain the capacitance type level measurement.

### Unit - V

5. a) List the materials used in the humidity sensor.
- b) How thermocouple calibrated?
- c) What is meant by industrial type bimetallic thermometers?
- d) Define Humidity. List out the factors which should be considered as possible source of error in humidity measurements.