

[Time: Three Hours]

[ Marks: 80]

- N.B:
1. Question.No.1 is compulsory.
  2. Attempt any three questions from remaining five questions.
  3. Assume suitable data wherever necessary.

Attempt any four .

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a What is base metal and rare metal thermocouples? State their advantages and disadvantages.

b The dead zone in a certain pyrometer is 0.125 %of span .The calibration is  $400^{\circ}\text{C}$  to  $1000^{\circ}\text{C}$ .

What temperature change might occur before it is detected?

c Classify transducers with suitable example.

d Explain absolute humidity and relative humidity.

e Explain liquid level measurement using float and LVDT with appropriate diagram

a Explain different types of errors in measurements with their remedies.

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b Explain flapper nozzle system and comment on its application.

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a Explain radioactive type level detector in detail.

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b A capacitive transducer uses two quartz diaphragms of area  $750\text{ mm}^2$  separated by a distance of  $3.5\text{ mm}$  .A pressure of  $900\text{ kN/m}^2$  when applied to the top diaphragm produces a deflection of  $0.6\text{ mm}$  .The capacitance is  $370\text{ pF}$  when no pressure is applied to the diaphragms .Find the value of capacitance after the application of a pressure of  $900\text{ kN/m}^2$ .

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a State different types of pyrometers .Explain with a neat sketch any one of them.

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b State and explain laws of intermediate temperature and intermediate metals of thermocouple. Write the significance of these laws.

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a Explain construction and working principle of LVDT.

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b A linear resistance potentiometer is  $50\text{ mm}$  long and is uniformly wound with a wire having a resistance of  $10\text{ K}\Omega$ . Under normal conditions, the slider is at the center of the potentiometer .Find the linear displacement when the resistance of the potentiometer as measured by a Wheatstone bridge for two cases is i)  $3850\Omega$  ii)  $7560\Omega$ . Are the two displacements in the same direction? If it is possible to measure a minimum value of  $10\Omega$  resistance with the above arrangement, find the resolution of the potentiometer in mm.

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Write a short note on (Any two) :-

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a Hall Effect Transducer

b Sound Pressure Level (SPL )meter

c Lead wire compensation in RTD