

Code No: 158DP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech IV Year II Semester Examinations, September - 2022****MEASURING INSTRUMENTS****(Common to CE, EEE, ME, CSE, EIE, IT)****Time: 3 Hours****Max.Marks:75****Answer any five questions****All questions carry equal marks**

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- 1.a) Explain about sources of errors different types of errors and precautions to minimize them.
b) The accuracy of five digital voltmeters are checked by using each of them to Measure a standard 1.0000V from a calibration instrument. The voltmeter readings are as follows:
 $V_1=1.001v$, $V_2=1.002v$, $V_3=0.999v$, $V_4=0.998v$ and $V_5=1.0000v$.
Calculate the average measured voltage and the average deviation. [7+8]
- 2.a) Explain the difference between basic standards and secondary standards.
b) Calculate the maximum percentage error in the sum and difference of two voltage measurements when $V_1=100v \pm 1\%$ and $V_2=80v \pm 5\%$. [7+8]
- 3.a) Derive gauge factor due to change in dimensions of a strain gauge element when it is subjected to tensile force.
b) Calculate the gauge factor S if a 1.5 mm diameter conductor that is 24 mm long Changes length by 1 mm and diameter by 0.02 mm under a compression force. [8+7]
- 4.a) Explain how LVDT is used to measure linear displacement.
b) Show that a parallel plate capacitor serves as the most suitable transducer for measurement of linear and angular displacements. [7+8]
- 5.a) Discuss how length is measured using optical method.
b) Explain how roughness is measured accurately. [7+8]
- 6.a) Explain the velocity measurement method and discuss about the possible errors in measurement.
b) Using multiplexing, explain multi-channel data acquisition system. [8+7]
- 7.a) Illustrate the principle of force summing devices with an example.
b) What are the main differences in measuring low pressure and high pressure? [7+8]
- 8.a) Show that a parallel plate capacitor serves as the most suitable transducer for measurement of linear and angular displacements.
b) A transducer that measures force has nominal resting resistance of 300Ω and is excited by 7.5V. When a 980 dyne force is applied, all four equal resistance bridge elements change resistance by 5.2Ω . Find the output voltage E_o . [7+8]

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