Time : Three Hours

P. Pages : 2

B.E. Mechanical Engineering Fifth Semester

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GUG/W/18/1649

Max. Marks : 80

1.	Note a)	 All questions carry equal marks. Answer questions 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10. Assume suitable data wherever necessary. Illustrate your answers wherever necessary with the help of neat sketches. Use of non programmable calculators is allowed. Write suitable example, explain the following functional elements of a measurement system.	8
		iii) Variable Manipulation element. iv) Data storage element.	
	b)	Enlist the different methods of correction to the spurious inputs. Explain in detail method of opposing inputs.	8
		OR	
2.	a)	What are the different types of errors in measurements? Describe in detail systematic, random and miscellaneous types of errors.	8
	b)	 Explain the terms. i) Accuracy and precision. ii) Sensitivity and linearity. iii) Threshold and Resolution. iv) Hysteresis. 	8
3.	a)	Draw the response curve for the first order instrument subjected to ramp input. Describe the terms steady state error and transient error. How much is the steady state time lag for the first order systems subjected to ramp input.	8
	b)	A thermometer with a time constant of 10 sec is subjected to a change in temperature from 30° to 100°C, at a constant rate in 3 minutes. Find at the indicated temperature at 30, 40 and 80 seconds. Plot the input and output curve.	8
		OR	
4.	a)	Plot the curves for step response of I and II order instruments explain the terms the terms tolerance band, steady state value, response time for each of the input, further discuss the effect of increasing and decreasing the damping ratio on speed of response in case of II order instruments.	8
	b)	A temperature sensing device is initially at a temperature of 20°C and is suddenly plunged into a liquid bath, which is maintained at 150°C. The device indicated 95°C after time interval of 3 seconds. Estimate the time constant of the device. Also calculate the indicated temperature when time equals to five time constants.	8

Sketch and explain the working of LVDT. 5. a)

8

b)

OR

Sketch and explain the working of photo-pickup arrangement for speed measurement.

A shaft is mounted with a disc with marks as shown in the fig. If the shaft is 6. a)



rotating with 300rpm, what would be seen if the stroboscope is flashing with

i) 150 flashes per second.

Discuss the advantages.

b)

- 100 flashes per second. ii)
- iii) 300 flashes per second.
- 600 flashes per second. iv)
- v) 900 flashes per second. Sketch the image of disc as seen in each case.
- Explain working and applications of optical devices for linear and rotary displacements. 8 b)
- 7. A strain gauge has a nominal resistance of 350Ω and a gauge factor of 1.8. It is mounted a) 8 in a quarter wave bridge circuit, which is balanced when strain is zero. The gauge is mounted on a 1 cm² aluminium rod, with E = 70 GPa. The gauge sense the axial strain. The bridge output is 1mv for a bridge input of 5V. What is the applied load assuming the rod is in uniaxial tension. Draw the bridge ckt.
 - Describe construction and working of Torque cell with a neat sketch. b)

OR

8.	a)	Sketch and explain working of McLeod gauge.	8
	b)	Sketch and explain working of pressure cell with diaphragm and strain gauges. Explain the advantages.	8
9.	a)	With a neat sketch, describe the working of rotameter. What are its advantages and disadvantages.	8
	b)	What are the various laws of thermocouples. Explain working of thermocouples. What are thermopiles? Where are they used?	8
		OR	
10.	a)	Draw the schematic diagram of an optical pyrometer and describe its working.	8

Explain the working of turbine type flow meter with neat sketch.

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