

B.E. / B.Tech. Instrumentation Engineering (Model Curriculum) Semester-III
IN302M / IN302 - Sensors & Transducers

P. Pages : 2



Time : Three Hours

GUG/S/25/14010

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.

- 1.** a) Give brief description of following with an example of each. 8
 a) Primary and secondary transducers
 b) Passive and active transducers
- b) Explain in detail calibration technique and draw the calibration curve in general. 8

OR

- 2.** a) What is range and span? 8
- b) Write short note on selection criterion for transducers. 8
- 3.** a) Describe the construction and working of column type, hydraulic and pneumatic load cell with neat diagram. 8
- b) A compressive force is applied to a structural member. The strain is 5 micro-strains. Two separate strain gauges are attached to the structural member, one is a nickel wire strain gauge having a gauge factor of 2.1 and the other is nichrome wire strain gauge having a gauge factor of 2, calculate the value of resistance of the gauges after they are strained. The resistance of strain gauges before being strained is 120Ω . 8

OR

- 4.** a) Define magnetostrictive sensor. Mention the advantages and disadvantages of magnetostrictive sensors. 8
- b) Derive the mathematical expression for Gauge Factor. 8
- 5.** a) A pressure measuring instrument uses a capacitive transducer having a spacing of 4mm between its diaphragms. A pressure of 600 kN/m^2 produces an average deflection of 0.3mm of the diaphragm of the transducer. The transducer which has a capacitance of 300 pF before application of pressure and is connected in an oscillator circuit having a frequency of 100 kHz. Deduce the change in frequency of the oscillator after the pressure is applied to the transducer. 8
- b) Describe the construction and working of magnetic sensors. 8

OR

6. a) How displacement is measured with the help of potentiometer resistive transducers? Explain with suitable example. 8
- b) Describe the basic working principle of optical sensor with neat sketch. 8
7. a) Illustrate in short eddy current type accelerometer. 8
- b) While measuring the speed of a steam turbine with stroboscope single line images were observed for stroboscope setting of 3000, 4000 and 5230 rpm. Evaluate the speed of turbine. 8

OR

8. a) Draw and discuss potentiometer type accelerometer. 8
- b) Describe the setup of measurement of the speed with the help of magnetic pickup. Comment on how accuracy and range can be increased in it. 8
9. a) List various types of proximity sensors. Discuss the feature of proximity sensors. 8
- b) Explain the following with a neat sketch Electromagnetic suspension type gas densitometer. 8

OR

10. i) Describe smoke detector in brief. 16
- ii) Write short note on flame detector.
- iii) Write short note on leak detector.
