

B.TECH. - ELECTRICAL ENGINEERING**Term-End Examination****December, 2013****BIEE-019 : ELECTRICAL INSTRUMENTATION***Time : 3 hours**Maximum Marks : 70*

*Note : Attempt any five questions.**All questions carry equal marks.*

1. (a) Distinguish between : 7
 - (i) Active and passive transducers.
 - (ii) Input and output transducers.Illustrate your answer with suitable example.
- (b) A force of δ newton is impressed upon a piezo-electric crystal having dimension of $6 \text{ mm} \times 6 \text{ mm} \times 1.5 \text{ mm}$ thick. For the crystal materials, charge sensitivity = $140 \times 10^{-12} \text{ C/N}$, Primitivity = $12 \times 10^{-9} \text{ N/m}$ and modulus of elasticity = $11.5 \times 10^6 \text{ N/m}^2$. Make calculation for the capacitance. 7
2. (a) Explain the major consideration which govern the selection of an instrument transducer. List some advantages of electrical transducers over mechanical transducers. 7
- (b) Differentiate between a bridge, operated on the null principle and a bridge, operated on the deflection principle. 7

3. (a) A resistance of 2 ohms has been measured by using a null type wheatstone bridge circuit. If the accuracy of bridge ratio is $\pm 0.05\%$ and that of variable resistor R_2 is $\pm 0.025\%$. Calculate the possible error in the measurement of resistance of 2 ohm. 10
- (b) Write short note on LVDT. 4
4. (a) Define modulation and demodulation. Describe the operation of amplitude modulation and frequency modulation system. 7
- (b) Mention the different recording instruments and describe the operation of an ultraviolet recorder. 7
5. (a) Describe the operation of cistern (Single Column) manometer and inclined tube manometer. Derive the relationship between the input and the output in each case. 7
- (b) What is the case compensation and the full compensation in a filled-in-system? What is the bulb elevation error in a filled-in-system? Is it larger in a gas-filled-system than in a liquid-filled-system? 7
6. (a) Mention different techniques available for the measurement of strain and explain the principle on which the operation of an electrical resistance strain gauge is based. 7
- (b) Give several examples of digital methods of angular velocity measurement. Sketch and explain the operation of any one of them. 7

7. (a) The deviation change of certain integral controller has a sinusoidal variation with time. Workout the phase difference between the manipulated variable and the deviation. 7
- (b) Write short notes on : 7
- (i) Fibre optic transducers.
 - (ii) Spectrum analyzer.
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