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Total number of printed pages – 2

B. Tech  
PCEI 4305

Sixth Semester Regular / Back Examination – 2015

INSTRUMENTATION DEVICES AND SYSTEMS - II

BRANCH (S) : AEIE, IEE

QUESTION CODE : J 285

Full Marks – 70

Time : 3 Hours



Answer Question No. 1 which is compulsory and any **five** from the rest.  
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
  - (a) What is the role of charge amplifier in piezoelectric measurement system ?
  - (b) What is the advantage and disadvantage of using floats in level measurement ?
  - (c) What zero suppression and zero elevation ?
  - (d) Which optical sources are used in optical measurement system ?
  - (e) What is the advantage of using photodiode detector and also explain what dark current is ?
  - (f) State Stefan-Boltzmann's law.
  - (g) Give a comparison between monomode step index and multimode step index fibre.
  - (h) What is the basic principle behind flapper nozzle system ?
  - (i) In a conveyor system which type of motor is being used and justify your answer ?
  - (j) Write the expression of overall attenuation loss ( $\alpha$ ) in a length (L) of an optical fibre.
2. (a) Give a brief description of principle of operation of broad band pyrometer with its advantage and disadvantage. 5

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- (b) A total radiation pyrometer is calibrated with respect to a black body conditions is being used to measure of a surface with emissivity of 0.7 and measures the temp as 1000°C. Determine the true temp of the surface. Also calculate the temp. measured by an optical pyrometer for the above case. (Assume emissivity of 0.7 at  $\lambda = 0.6 \mu\text{m}$ ). 5
3. (a) Derive the transfer function for piezoelectric system with ideal charge amplifier. 5
- (b) A seismic accelerometer has seismic mass of 0.005 kg, stiffness of 8 N/m and damping ratio of 0.1. If the input acceleration is  $40 \sin 30t \text{ m/s}^2$ . Calculate the displacement of the mass. 5
4. (a) Explain briefly the principle and signal conversion processes in a pneumatic system. 5
- (b) Explain the different types of Control Valves and their characteristics. 5
5. (a) Give a brief description of ultrasonic level indicator. 5
- (b) Why conductivity measurement is required and explains its basic principle. 5
6. (a) Explain pneumatic and hydraulic actuator briefly. 5
- (b) What is ladder diagram ? Explain its elements with symbols used in ladder diagram. 5
7. (a) What is PLC ? Explain its basic structure with all its elements briefly. 5
- (b) Derive an expression for  $K_{sm}$  while coupling a source to a fibre. 5
8. Write short notes on any **two** : 5×2
- (a) Power electronic devices used for process-control
- (b) Photo resistor
- (c) Humidity Measurement
- (d) Application of accelerometer.

