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SARDAR PATEL UNIVERSITY
S.Y. B.Sc. SEMESTER-III EXAM (CBCS)
INSTRUMENTATION (Transducers, Probes and Lasers)
SUB. CODE: US03CINS22

14 June - 2022

Time: 12:00 pm to 2.00 pm

Mark: 70

Q.1 Multiple choice questions.

[10]

1. _____ transducer are piezo-electric sensors.
 (a) active (b) passive (c) semiconductor (d) resistive
2. A transducer of the variable type consists of a coil wound on a _____ material.
 (a) paramagnetic (b) ferromagnetic (c) diamagnetic (d) tera-magnetic
3. Which of the following transducer are measure displacement?
 (a) Resistive (b) Inductive (c) both (a) and (b) (d) Capacitive
4. The gauge factor is defined as $K = \frac{\Delta R}{R} \times \frac{l}{\Delta l}$
 (a) $\frac{\Delta R}{R} \times \frac{l}{\Delta l}$ (b) $R/\Delta R \times l/\Delta l$ (c) $\Delta R/R \times \Delta l/l$ (d) $\Delta R \times l/\Delta l$
5. The rotational resistive transducer are used for the measurement of _____ displacement.
 (a) angular (b) rotation (c) linear (d) circular
6. In current probe, the decay time constant is sometimes called _____ ratio.
 (a) R/L (b) L/R (c) RL (d) R + L
7. In capacitive loading, the effect of rise time is _____ RC.
 (a) 2.2 (b) 2.3 (c) 2.4 (d) 2.5
8. Which of the following is a unique property of laser?
 (a) Directional (b) Coherence (c) Wave length (d) Speed
9. The directionality property of laser can be used in _____.
 (a) surveying (b) lidar (c) (a) and (b) (d) none of these
10. _____ is pumping source in Nd: YAG laser.
 (a) Chemical (b) Optical (c) Electrical (d) Mechanical

Q.2 (a) Fill in the blanks.

[08]

1. _____ transducer measured by standard method used for electrical measurements.
2. _____ are non-metallic resistors made by sintering mixtures of metallic oxides.
3. In differential probe, CMMR is called _____.
4. The relative phase difference between to point in time remain fixed is called _____ coherence.

(b) Answer the following sentences in form of true or false.

1. In potentiometer, the motion of sliding contact may be cylinder.
2. The inductive transducer a motion between conductor and magnetic field induce a voltage in conductor.
3. In ac current probe, head is a secondary coil that has been wound to precise specifications on a magnetic core.
4. Laser is called as non material knife.

Q.3 Short Answer Questions. (Attempt any ten)

[20]

1. List different types of transducers.
2. State the differentiate between passive and active transducer.
3. Draw the figure of helical gauge and rosette gauge.
4. State the advantages of differential output transducer.
5. Draw the block diagram of LVDT.
6. Define the advantages of resistance thermometers.
7. State the features of ideal probe.
8. State the advantages of high voltage passive probe.
9. Draw the wave form of probe attenuation compensation.
10. State the block diagram of Stimulated absorption, Spontaneous emission and Stimulated emission in laser.
11. Draw the diagram of semiconductor laser.
12. State the advantages of gas laser.

Q.4 Answer in details of any four from the following questions.

[32]

(Each of 8 marks)

1. Discuss the types of resistance wire gauge and calculate gauge factor.
2. Discuss the platinum resistance thermometer with necessary figure and also write the advantages and limitations.
3. Describe with the help of a diagram the construction of an LVDT. Also write its applications, advantages and disadvantages.
4. Discuss the capacitive and Piezo-electrical transducer with necessary figure.
5. Write a detailed note on active probe and differential probe.
6. What is capacitive loading? Discuss the probe and source of capacitive loading effect on rise time, bandwidth and probe attenuation ratio.
7. Write a detail note on semiconductor laser and Dye laser.
8. State the necessary diagram and discuss the Nd: YAG laser. Also its applications.