Reg. No. : | | | | | | | | | | |

Question Paper Code: 54505

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Electronics and Instrumentation Engineering

15UEI405 - INDUSTRIAL INSTRUMENTATION - I

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. When DC tacho generator is used for measurement of speed of a shaft, it requires frequent calibration because the

   (a) Contact wears off
   (b) Strength of permanent magnet decreases with age
   (c) Armature current produces heating effects
   (d) Change in atmospheric temperature induces more error

2. Which of the following is not a speed measuring instrument?

   (a) Psychrometer (b) Stroboscope (c) Tachometer (d) all the above

3. Piezoelectric accelerometers

   (a) should not be used for high frequencies above 10Hz
   (b) should be used for low frequencies
   (c) should use a monitoring source of low input impedance
   (d) have a low natural frequency

4. A car initially at rest accelerates in a straight line at $3m/s^2$. What will be the speed after 2 seconds?

   (a) 0 m/s (b) 5 m/s (c) 6 m/s (d) 3 m/s

5. Point out the gauge which measures pressure by sensing changes in the thermal conductivity of the gas is

(a) Pirani (b) Slack diaphragm
(c) McLeod (d) Bellow

6. Pressure of 0.0001 absolute psi can be measured by _____ gauge.

(a) McLeod (b) Pirani (c) Thermocouple (d) None of these

7. Recording is not possible with

(a) Liquid in glass thermometer (b) Thermocouple
(c) Filled in system thermometer (d) Pyrometer

8. Self compensating capillary tube is used in the filled in system thermometer to eliminate or minimize

(a) elevation effect (b) immersion effect
(c) barometric effect (d) temperature effect

9. Which thermocouple material can be used for measurement of temperatures above 1000 °C.

(a) Copper – Constantan (b) Chromel – Alumel
(c) Chromel – Constantan (d) Iron - Constantan

10. Radiation pyrometers are used in the temperature range of

(a) 0-500°C (b) 500-1000°C
(c) 1200-2500°C (d) -250-500°C

PART - B (5 x 2 = 10 Marks)

11. Write the relationship between gauge factor and strain in a strain gauge.

12. List any two applications of Seismic instrument.

13. Differentiate between absolute pressure and gauge pressure.

14. Label any four temperature scales.

15. Define temperature

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the sensing principle and operation used in pneumatic load cell with a neat diagram. (8)

(ii) Illustrate the operation of piezoelectric load cell. (8)

Or

(b) Analyze the working of DC and AC tacho generator with neat sketch and give its merits and demerits. (16)

17. (a) Explain in detail about Piezoelectric and variable reluctance accelerometer with neat sketch. Give its merit and demerits. (16)

Or

(b) Describe the operation of pressure head type and ultrasonic densitometer with necessary diagrams. (16)

18. (a) Explain in detail about electrical methods of pressure measurement with neat diagram. (16)

Or

(b) Explain the process involved in calibrating pressure gauges using dead weight tester. (16)

19. (a) List the different types of filled in system thermometer and discuss the various sources of errors and their compensation in filled in system thermometer. (16)

Or

(b) Discuss the electrical methods of temperature measurement. Resistive Temperature Detectors (RTD). (16)

20. (a) Construct a cold junction compensation box for Iron-Constantan thermocouple to measure a process temperature and explain the process with suitable connection diagrams. (16)

Or

(b) Illustrate the construction and working principle of two colour radiation pyrometers with its advantages and disadvantages. (16)

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