

[63]

Seat No. \_\_\_\_\_

**SARDAR PATEL UNIVERSITY**  
**T.Y.B.Sc V<sup>th</sup> Semester Examination, (under CBCS)**  
**USO5CAPH04 (Process Instrumentation-I)**  
**Monday, 18<sup>th</sup> November 2019**  
**10.00 A.M. – 01.00 P.M.**

Marks: 70

**Que 1 Multiple choice questions.**

[10]

- (1) Which of the following temperature sensors has excellent linear characteristics?  
 (a) RTD (b) Thermocouple (c) Radiation pyrometer (d) IC
- (2) The principle of working of the constant volume thermometer is based on \_\_\_\_\_ law. (a) Boyle (b) Newton (c) Charle (d) Gauss
- (3) \_\_\_\_\_ of the following cannot be used for negative pressure.  
 (a) piezometer (b) U-tube manometer (c) Pirani gauge (c) bourdon gauge
- (4) Which of the following instruments measure the below 1 mm of Hg?  
 (a) manometer (b) ionization gauges (c) Pirani gauge (d) CRO gauge
- (5) 1 micron = \_\_\_\_\_ mm of Hg.  
 (a)  $10^{-1}$  (b)  $10^{-2}$  (c)  $10^{-3}$  (d)  $10^{-4}$
- (6) 1 HP = \_\_\_\_\_ W.  
 (a) 743 (b) 736 (c) 754 (d) 732
- (7) Which of the method to detect the angular twist of a rotating shaft?  
 (a) electrical (b) optical (c) force (d) speed
- (8) The proximity sensor is used in \_\_\_\_\_ field.  
 (a) Electric (b) magnetic (c) optical (d) thermal
- (9) The specific weight is defined as the weight per unit \_\_\_\_\_.  
 (a) pressure (b) height (c) volume (d) mass
- (10) The kinematic viscosity to the ratio of \_\_\_\_\_.  
 (a)  $\mu/\rho$  (b)  $\rho/\mu$  (c)  $\mu.\rho$  (d)  $\mu^2\rho$

**Que 2 Short answer types question (Any Ten)**

[20]

- (1) Define: Temperature Scales.
- (2) State any one advantage and disadvantage of liquid-in-glass thermometer.
- (3) A platinum resistance thermometer has a resistance of 140.5ohm and 100 ohm at 100<sup>o</sup>C and 0<sup>o</sup>C respectively. If its resistance becomes 305.3 ohm when it is in contact with a hot gas, determine the temperature of the gas. The temperature coefficient of platinum is 0.0039<sup>o</sup>C<sup>-1</sup>.
- (4) Draw diagram for the relation between absolute, gauge and atmospheric pressure.
- (5) State any four characteristics of manometric liquid.

(1)

(PTO)

- (6) State the limitations of thermal conductivity gauges.
- (7) Define: force, work and power with units.
- (8) Give the characteristic features of hydraulic load cell.
- (9) Draw the block diagram of proximity torque sensors.
- (10) Give only the name of specific gravity scales.
- (11) State the principle of Gamma -ray liquid sensor.
- (12) Define: Velocity gradient.

- Que 3** (a) Draw the graph and discuss the resistance temperature characteristics of platinum and a typical NTC thermistor. [06]  
 (b) Write a short note on pressure thermometer. [04]

**OR**

- Que 3** (a) Discuss the Bimetallic thermometer in briefly. [06]  
 (b) Write a note on solid rod thermometer. [04]

- Que 4** (a) Discuss the ionization gauge with necessary figure. [06]  
 (b) Write a short note on Pirani gauge. [04]

**OR**

- Que 4** (a) Discuss the U-tube double column manometer for pressure greater than atmosphere. [06]  
 (b) Write a short note on below gauge. [04]

- Que 5** (a) Discuss the hydraulic load cell with necessary figure. [06]  
 (b) Write the dynamometer characteristics. [04]

**OR**

- Que 5** (a) Discuss the force measurement in scales and balances methods with figures. [06]  
 (b) Write a short note on optical and electrical torsion meters. [04]

- Que 6** (a) Discuss specific gravity bottle method and hydrometer method with proper figure. [06]  
 (b) Define: Density and Specific gravity. [04]

**OR**

- Que 6** (a) Draw and discuss the direct and indirect liquid-level measurement methods. [06]  
 (b) Define: Humidity and Moisture. [04]