Total No. of printed pages = 5

CAI-612/I Instt./6th Sem/2018/M

INDUSTRIAL INSTRUMENTATION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

Answer *all* questions.

1. Fill in the blanks : 1×5=5

   (a) 100Pa = ——— N/m^2.

   (b) 173°C = ——— K.

   (c) Poise is the unit of ———.

   (d) ——— fluid is used in hydraulic load cell.

   (e) ———— gauge is used to measure pressure above 70000 MPa.

[Turn over

2. Choose the correct answer from the multiple choice : $1 \times 5 = 5$

(a) The essential elements needed to construct an accelerometer are

(i) Dashpot and spring

(ii) Mass and dashpot

(iii) Spring and mass

(b) The metal alloy used in Type J thermocouple is

(i) Copper constantan

(ii) Iron constantan

(iii) Chromel constantan

(c) The ratio of absolute viscosity to density of the fluid is

(i) Specific viscosity

(ii) Relative viscosity

(iii) Kinematic viscosity

(d) Which is an active transducer ?

(i) Thermistor

(ii) RTD

(iii) Thermocouple

(e) Which is the gravitational type pressure gauge ?

(i) Ionization gauge

(ii) U-tube manometer

(iii) Pirani gauge

3. Match the following : 1×5=5

(a) Densito meter	–	RTD
(b) Platinum	–	Piezo electric
(c) Stroboscope	–	Piezo resistive
(d) Rochelle salt	–	Hot wire gas bridge
(e) Strain Gauge	–	Rotatory speed

4. Define the following and also write its SI unit : $2\times5=10$

(a) Viscosity

(b) Temperature

(c) Pressure

(d) Density

(e) Force

PART – B

Answer any *three* questions.

5. (a) Explain photoelectric pressure transducer. 4

(b) Explain a method for measuring pressure below 1mm of Hg. 5

(c) Explain the construction and working of a pressure transducer using LVDT and bellow. 6

6. Explain the following : $5\times3=15$

(a) Photoelectric tachometer

(b) Cantilever beam load cell

(c) Dead-weight tester.

7. (a) A strain gauge of resistance 350Ω and gauge factor of 1.5 is bonded to steel having an elastic limit stress of 400 MN/m^2 and modulus of elasticity is 200 GN/m^2. Calculate the change in resistance

(i) due to change in stress equal to 1/20th of elastic range

(ii) due to change of temperature of 20°C if the material is advance alloy. The resistance temperature coefficient of advance alloy is $20 \times 10^{-6} C^{-1}$. 5

(b) Explain displacer type densitometer. 5

(c) Explain LVDT accelerometer. 5

8. (a) Explain liquid filled system thermometers and RTD. 7

(b) Explain the construction and working of Saybolt's viscometer and rotameter type viscometer. 8