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**Question Paper Code : 21533**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electronics and Instrumentation Engineering

EI 2303/EI 53/10133 EI 506 — INDUSTRIAL INSTRUMENTATION – II

(Common to Instrumentation and Control Engineering)

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by laminar and turbulent flow?
2. Mention the advantages and disadvantages of Pitot tube.
3. Write the difference between the volume flow rate and mass flow rate.
4. How is  $k$  factor of turbine flowmeter determined?
5. Write the working principle of target flowmeter.
6. A vortex shedding flowmeter is mounted in a pipe line of 100 mm diameter. The bluff body is a rectangle of width 40 mm and the strouhal number is 0.18 while  $k$  is 1.5. If the vortex shedding frequency is 20 Hz. What is the volume flow rate?
7. How are direct and indirect methods of level measurement done?
8. In an air bubble gage, the bubble tube is immersed in water up to 400 mm below the water surface. If the air pressure is to be measured by
  - (a) a U tube mercury manometer what will be the mercury head height in mm and
  - (b) a bourdon gage what pressure will it read in  $N/m^2$ ?
9. Define relative humidity.
10. What is Newtonian and non Newtonian fluid?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With a neat diagram explain the working principle and construction of orifice meter. (8)
- (ii) Water is flowing through a venturi having 40 mm throat diameter. If 1200 kg of water flows in two minutes and the discharge coefficient is 0.95, What will be the pressure head on a mercury manometer connected to the venture? Density of water is 1000 kg/m<sup>3</sup> and mercury is 13600 kg/m<sup>3</sup>. (8)

Or

- (b) (i) Explain the installation of venturimeter. (6)
- (ii) With a neat schematic diagram explain the construction and working of Pitot tube. (6)
- (iii) Determine the flow velocity of water of density 1000 kg/m<sup>3</sup> at the head of a Pitot tube if it produces a pressure differential of 10 kPa between the outlets and if the same pressure differential is obtained in air at an altitude where the density of air is 0.650 kg/m<sup>3</sup>, determine the velocity of air flow. (4)
12. (a) (i) Explain the working of coriolis mass flowmeter. (6)
- (ii) A rotameter has an effective height of 200 mm, effective base diameter 10 mm and top diameter 20 mm. It has a float of diameter 10 mm, thickness 3 mm and density 2500 kg/m<sup>3</sup>. Its discharge coefficient is 0.95, if water is flowing through it and the float is at 100 mm height what is the rate of flow? (6)
- (iii) Explain the installation procedure of rotameter. (4)

Or

- (b) (i) Write the working principle and construction of positive displacement meters nutating disc meter. (10)
- (ii) Discuss the working of electronic type inferential meter. (6)
13. (a) (i) Explain the working of Doppler shift ultrasonic flowmeter. (8)
- (ii) How does laser Doppler anemometer work for the measurement of instantaneous velocity of liquids? (8)

Or

- (b) (i) Explain the working of different types of open channel flow meters. (10)
- (ii) Discuss the guidelines for the selection of flow meters. (6)

14. (a) Explain the working of ultrasonic level and nuclear radiation level meter work. (16)

Or

- (b) (i) How does capacitance type level meter work? (8)  
(ii) Explain the measurement of level in a pressure vessel. (8)
15. (a) (i) Explain the working of industrial type dew point determination. (8)  
(ii) How does dry and wet bulb psychrometer work? (8)

Or

- (b) (i) Explain the measurement of moisture content of solid bodies by measuring electrical conductivity. (8)  
(ii) How is relative humidity measured using automatic electronic psychrometer? (8)
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