

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9495

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Unique Paper Code : 2513040020

Name of the Paper : Measurement Technology (DSE)

Name of the Course : B.Sc. (H) Instrumentation

Semester : VII

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Use of scientific calculator is allowed.
3. Attempt any 5 questions in all.
4. Question no. 1 is compulsory.
5. All questions carry equal marks.

1. (a) A U-tube manometer containing mercury is used to measure the pressure of a gas. The difference in mercury levels is 150 mm. Atmospheric pressure is 101.3 kPa. Find the absolute pressure of the gas. (3)
(b) Give three applications of XY recorder. (3)
(c) What is the need of measuring humidity? What are hygroscopic materials used in hygrometers? (3)
(d) State the principle of operation of an orifice meter. (3)
(e) The chart speed of a recording instrument is 40 mm/s. One cycle of the signal is recorded over 5 mm. Determine the frequency of the signal. (3)
(f) Define an accelerometer and mention the key parts involved in its construction. (3)
2. (a) Explain the construction and working of a well type manometer with a neat diagram. (6)
(b) What is a diaphragm pressure gauge? Describe the construction and working of a flat and corrugated diaphragm. (6)
(c) Describe the working principle, construction and working of a thermal conductivity gauge. (6)
3. (a) A venturi meter is fitted in pipe carrying water. The upstream pipe diameter is 150 mm and the throat diameter is 75 mm. The pressure difference between the upstream section and the throat is measured by a mercury U-tube manometer which shows a deflection of 0.18 m. Take density of water to be 1000 kg/m^3 and density of mercury to be 13600 kg/m^3 . If the coefficient of discharge is 0.98, find the volumetric discharge through the pipe. (6)

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- (b) With the help of a neat diagram, describe the construction and working of a rotameter. (6)
- (c) Which flowmeter works on the principle of Faraday's law of electromagnetic induction? Explain its principle and working. Write its two applications also. (6)
4. (a) Describe the operation of a strip chart recorder. List two mechanisms used for recording. (6)
- (b) Explain the three types of rough indicators used for detection of acceleration. (6)
- (c) With the help of a neat diagram, explain the working principle of an ink jet printer. (6)
5. (a) Discuss the function of a sling psychrometer in measuring humidity. Explain how wet-bulb and dry-bulb temperatures are used to find relative humidity. (6)
- (b) Explain the working of a radioactive moisture measurement system using a schematic diagram. (6)
- (c) What is a Psychrometric Chart? List and discuss all the terms by which we can determine humidity. (6)
6. (a) What are bellows? Describe with neat sketch how they can be used to measure absolute pressure and differential pressure? (6)
- (b) Explain the construction and working of a standard pressure device used for testing and calibration of pressure measuring instruments. (6)
- (c) With the help of neat sketches, describe laminar and turbulent flow in pipes. Explain the characteristics and practical example of each type of flow. (6)
7. (a) Explain the working of mechanical tachometer which is preferred for low RPM and high RPM measurement. (6)
- (b) Mention two desirable properties of manometric fluids. A well type manometer using a liquid of specific gravity 0.8 has a well of 50 mm diameter and a tube of 2mm bore. If a scale correctly graduated in mm is used and datum is 0 mm, calculate the reading on scale when a pressure of 8 mm of mercury is applied. Calculate the percentage error in reading. Assume pressure on account of 1mm of mercury is 133 N/m^2 and density of water as 1000 kg/m^3 . (6)
- (c) With a neat labeled diagram, describe the operation of a rotary pump. Explain how it creates vacuum and mention its two applications also. (6)