Vidyavardhini's College of Engineering and Technology, Vasai (West)

First Year Engineering
Academic Year: 2024-2025
Question Bank: Internal Assesment-I

Subject/Code: Elective Physics/BSC2023   Date: 18/02/2025

Mod-1: Introduction

1. Explain any 3 of the following terms in mechanical measurements: (3 Marks)

   (a) Error of measurement

   (b) Correction and correctness of measurement

   (c) Reliability of measurements

   (d) Verification and calibration

2. Define any 3 of the following terms   (3 Marks)

   (a) Measuring range

   (b) Sensitivity

   (c) Scale Intervals

   (d) Response time

3. What is difference between accuracy and precision?   (2 Marks)

4. Describe any 2 of the following types of errors and how they can be taken care of? (2 Marks)

   (a) Static error

   (b) Environmental error

   (c) Characteristic error

   (d) Dynamic error

5. A small population of $N = 5$ students scored the following marks in a physics test: $75, 80, 82, 88, 76$. Calculate the sample mean and sample standard deviation.   (2 Marks)

6. The weights in kg of a population of 6 individuals are $58, 60, 62, 64, 66, 68$. Calculate the population mean. Determine the population standard deviation.   (2 Marks)

7. A researcher measures the following data: (2 Marks)

$$(x_1, y_1) = (1, 3), \ (x_2, y_2) = (2, 5), \ (x_3, y_3) = (3, 7), \ (x_4, y_4) = (4, 10)$$

Find the equation of the best-fit line $y = mx + c$ using the least squares method.

Mod-2: Measurements by light – Wave Interference

1. Explain the significance of monochromatic light in interference. (2 Marks)

2. What is an optical flat? Describe its application in checking the flatness of a surface using fringe patterns. (4 Marks)

3. Write short notes on the surface contour test and state the expression used to estimate the depth of a scratch. (3 Marks)

4. In an interferometry experiment, following patterns were observed with some typical specimen, what do the following fringe contours indicate? (2 Marks)
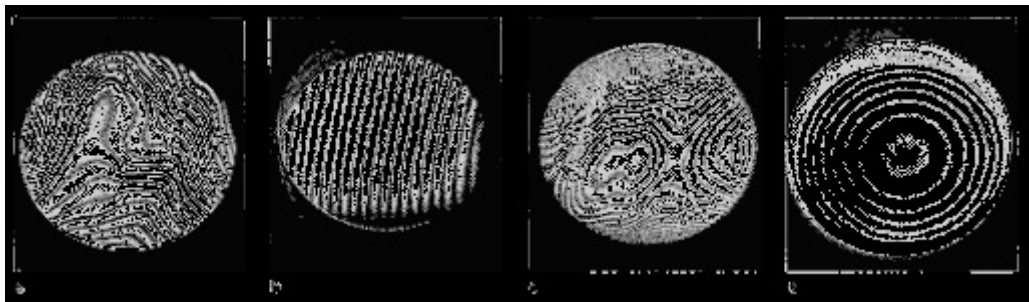
5. In an interferometry experiment for flatness testing, two light beams of wavelength $600\,nm$ interfere, creating a fringe shift of 10 fringes over a surface length of $5\,mm$. What is the height variation of the surface? Ans: $3.0\,\mu m$ (2 Marks)

6. A scratched surface is tested using an optical flat. If the distance between two fringes is $1\,mm$ and the depth of the scratch is $0.15\mu m$, determine the wavelength of light used. Given distance due to scratch is $0.5\mu m$. (2 Marks)

Mod-3: Transducers

Part A: 4-Mark Questions

1. Explain the classification of transducers based on function, performance, and output.

2. Describe the working principle of a solid-state transducer with an example.

3. Explain the construction and working of an optical transducer.

4. What are piezoelectric transducers? Describe their working principle and applications.

Part B: 2-Mark Questions

1. What are the key advantages of solid-state transducers over conventional transducers?

2. Differentiate between active and passive transducers with examples.

3. What is the principle of operation of an optical transducer?

4. List two advantages and two disadvantages of piezoelectric transducers.