

- (b) In a test, temperature is measured 100 times with variation in apparatus and produces the following results.

Temp °C	397	398	399	400	401	402	403	404	405
Frequency	1	3	12	23	37	16	4	2	2

Calculate

- (i) Arithmetic Mean,
 - (ii) Standard Deviation,
 - (iii) Probable of error of one reading,
 - (iv) Standard Deviation.
12. (a) Derive the response of the underdamped Second order transducer for a step input.

Or

- (b) Explain in detail the parameters used for analyzing dynamic characteristics of instruments. Derive the equations for each parameter from the time response of second order system.
13. (a) Describe the construction of different types of strain gauge and working principle.

Or

- (b) (i) Explain the principle of operation and construction of hot wire anemometer. (8)
- (ii) Describe the procedure for measuring humidity using hair hygrometer. (8)
14. (a) Describe the principle of operation, construction and characteristics of LVDT with necessary diagrams.

Or

- (b) (i) Describe the construction and working of variable reluctance transducer. (8)
- (ii) Explain the operation of capacitor microphone with its frequency response. (8)
15. (a) (i) Describe the fundamentals of SQUID sensor. Explain working of DC SQUID and RF SQUID. List some of the applications. (10)
- (ii) Explain the principle of Hall Effect transducers. (6)

Or

- (b) (i) Explain the operation of phototransistor and any one application of it in detail. (8)
- (ii) Write short notes on MEMS and Film sensors. (8)