

BACHELOR OF ENGINEERING (MECHANICAL ENGINEERING) 1<sup>st</sup> YEAR 2<sup>nd</sup> SEMESTER EXAM 2023

## MEASUREMENT &amp; INSTRUMENTATION

Time: Three hours (Answer any *FIVE* questions)

Marks: 100

***Different parts of the same question should be answered together.  
All symbols carry their usual meanings unless otherwise mentioned.  
Assume any relevant data if necessary.***

1. a) What is static characteristics of an instrument? Briefly discuss about different desirable static characteristics of an instrument 14  
a) How static errors are classified? 6
2. a) What do you mean by dynamic characteristics of instrument? Briefly discuss them. 14  
b) What is calibration? Why it is important? 6
3. a) What is signal conditioning? Why it is important in measurement? 6  
b) How bridge circuits and amplifiers are used in signal conditioning? 14
4. a) Briefly explain about the different mechanical gauges used in pressure measurement. 12  
b) A U-tube differential manometer is connected between two pipes P and Q containing water. Deflection of mercury manometer shows 20cm. Pipe P is 20 cm below the pipe Q. Find the pressure of pipe P when pressure head of pipe Q is maintained 20m. Draw schematic. 8
5. a) What are the different flow measurement devices used in flow through pipes and open channels? Briefly explain. 12  
b) A venturi-meter of 10 cm throat diameter is connected with a pipe of diameter 20 cm used to measure flow of fluid of relative density  $800\text{kg/m}^3$ . The discharge through it is 100 litres per second. Find the reading of the oil-mercury differential manometer. (assume  $C_d=0.98$ ) 8
6. a) How temperature measurement devices are classified? Discuss the working principles of thermocouple and RTD. 12  
b) What are the different devices are used in level measurement? Explain any two of them. 8
7. Write short notes on: (any *FOUR*) 4 X 5 20
  - a) Rotameter
  - b) LVDT
  - c) Torque measurement
  - d) Speed measurement
  - e) Strain gauge