BACHELOR OF ENGINEERING (MECHANICAL ENGINEERING)
FIRST YEAR SECOND SEMESTER EXAM 2024

MEASUREMENT & 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 do you mean by mechanical gauges used in pressure measurement? Briefly explain working principle of any three. 12

   b) A differential manometer is connected between two pipes P and Q containing water. Deflection of mercury manometer shows 30cm. Pipe P is 20 cm above the pipe Q. Find the pressure head of pipe P when pressure of pipe Q is maintained 2 bar. Draw schematic. 6

   c) What if Pitot tube? 2

2. a) What are the different flow measurement devices used in pipe flow? Briefly explain working principle of any three. 12

   b) An orifice meter of 15 cm diameter is connected with a pipe of diameter 30 cm used to measure flow of water. The discharge of oil through it is 120 litres per second. Find the reading of the mercury differential manometer. (assume C_d=0.96, C_c=0.9) 8

3. a) How temperature measurement devices are classified? Explain the working principles of thermocouples and RTDs. 12

   b) Briefly explain about any four level measurement devices used engineering applications. 8

4. a) What is static characteristics of measuring instrument? Briefly explain about them. 14

   b) How static errors are classified? How those errors can be eliminated? 6

5. a) What do you mean by dynamic characteristics of measuring instrument? Briefly explain about them. 10

   b) What is calibration? Explain its importance. 5

   c) What do you mean by calibration chain and traceability? 5

6. a) What is signal conditioning? Why it is necessary in measurement? 6

   b) How bridge circuits and amplifiers are used in signal conditioning circuits? 14

7. Write short notes on: (any ***FOUR***) 4 X 5 20

   a) Classification of instruments

   b) LVDT

   c) Torque measurement

   d) Speed measurement

   e) DAS