Part-B

PDPM-INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, DESIGN AND MANUFACTURING JABALPUR

End Semester Examination 2023 Name Prateek Roll.NO.:22BEC088

Time: 2 Hours 30 Minutes **Instrumentation and Measurement** **EC-204b** **Marks: 45**

Note: Attempt all the questions. Clearly indicate if any assumption is considered.

Do not write or tick on question paper. Write all the answers of part-B in the answer sheet.

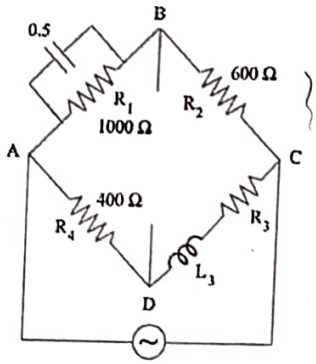
Part-B **Marks**

Q1. Derive the generalized expression for the ramp- response of first order measurement system. **5**

Q2. A first order instrument has its time constant equal to 0.2 s. **5**
(i) For sinusoidal input to the instrument, find the frequency at which the amplitude of the output signal is 0.8 times the amplitude of input signal.
(ii) For step input to the instrument, find the time at which the ratio of the output to input signals is 0.8.

Q3. State the principle the ultrasonic flow meter. Explain the transit time flow-meter. **5**

Q4. The arms of an a.c. Maxwell bridge are arranged as follows: AB is a noninductive resistance of 1,000 Ω in parallel with a capacitor of capacitance 0.5 μF, BC is a noninductive resistance of 600 Ω CD is an inductive impedance (unknown) and DA is a noninductive resistance of 400 Ω. If balance is obtained under these conditions, find the value of the resistance and the inductance of the branch CD. **5**



Q5. With the help of equivalent circuit diagram of linear variable differential transformer, explain its working principle and derive the expression of transfer function. **5**

Q6. Explain the thermocouple laws with the help of diagrams. **5**

Q7. Explain the capacitive based displacement and level sensor with the equation of equivalent capacitance and sensitivity. (Assuming suitable labeling) **5**

Q8. Explain the working principle of semiconductor IC temperature sensor. Derive the temperature dependent equation. **5**

Q.9 Explain the working of binary weighted D/A converter with the diagram of 5 bits and op-amp. **5**