[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

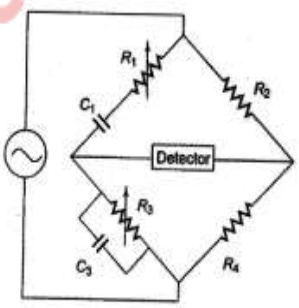
N.B: (i) Question No. 1 is compulsory & attempt any three out of the remaining five questions.
(ii) Assume suitable data if required but justify it logically wherever applicable. Figures to the right indicate full marks & every sub-question from Q.2 to Q.6 have equal weightage And have 10 marks each.

Q.1 **Attempt any four** **20**

(a) Define the following static characteristics of instruments.
(i) Sensitivity
(ii) Precision
(iii) Dead zone
(iv) Drift.
(v) Accuracy
(b) Draw a neat circuit diagram of LCR - Q meter & explain its operating principle.
(c) Compare dual slope and dual beam CRO.
(d) Describe operating principle of harmonic distortion analyzer with a neat block diagram.
(e) With a neat diagram, explain the principle of digital time measurement.
(f) Compare sensor and transducer.

Q.2 (a) Voltmeter having a sensitivity of 1000 ohm/volts read 100V on its 150 V scale when connected across an unknown resistor in series with a millimeter, when millimeter reads 5m A **20**
(i) Calculate apparent resistance of unknown resistor.
(ii) Calculate actual resistance of unknown resistor.
(iii) Calculate error due to loading effect of voltmeter.

(b) Wien Bridge is one of the AC bridges as shown in the Fig. 1 below. Derive conditions under which the bridge becomes balanced. Which quantity / parameter is it used to measure?



Q.3 (a) Draw the block diagram of dual trace CRO and explain its operation. **20**
(b) Explain how Lissajous patterns / figures are used for measurement of an unknown frequency & phase shift using a cathode ray oscilloscope (CRO).

Q.4 (a) Draw the circuit diagram and explain the operation of bridge used to measure capacitance. **20**
(b) Explain various features of digital storage oscilloscope.

Q.5 (a) Draw the neat diagram and explain the operation of successive approximation type DVM. **20**

(b) In a food processing unit, a highly acidic solution is stored in a storage tank where its level has to be continuously monitored round the clock. Your supervisor suggests that due to highly acidic nature of the solution, a non-contact transducer should be used for the level measurement? Which transducer will you use for above application? Describe its operation with a neat diagram.

Q.6 (a) Draw the diagram and explain the operation of Rotameter. **20**

(b) Explain the operation of Pirani gauge for pressure measurement?

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