Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	**: Electrical & Electronics Engineering**	**Semester**	**: 3rd**
Title of the Course	**: Electrical & Electronic Measurements**	**Course Code**	**: EEB 202**

Time: 2 Hours **Maximum Marks: 25**

Note : 1. Answer all the questions.

2. Do not write anything on the question paper except Roll number.

3. Assume any data suitably if found missing.

Q.1. The unknown inductance is determined by Anderson bridge and is given by the expression

$$L_x = \frac{CP\,[r(Q+S)+Q.S]}{S}$$

where $C = 1\mu F \pm 1.0\%; P = 1000\Omega \pm 0.4\%; Q = 2000\Omega \pm 1.0\%; r = 200\Omega \pm 0.5\%$; and $S = 2000\Omega \pm 0.5\%$.

Determine the magnitude of unknown inductance in Henry and limiting error in percentage **[5]**

Q.2. The law of deflection of a moving iron instrument is given by $I = 4\theta^n$ where θ is the deflection in radians and n is a constant. The self inductance of the coil is $10\,mH$ when the meter current is zero. The spring constant is .

(i) Determine the expression for self inductance of the meter as a function of θ and n.

(ii) With $n = 0.75$, calculate the meter current and the deflection that corresponds to a self inductance of $60\,m\,H$ **[5]**

Q.3. A moving coil instrument whose coil resistance is 5Ω and where full-scale deflection current is $15\,mA$ is to be used with a manganin shunt to measure current up to $100\,A$. Calculate the percentage error caused by a $15^{\circ}C$ rise in temperature. Take the temperature coefficient of the coil of copper as $0.004\,\Omega/\Omega/^{\circ}C$ and manganin $0.00015\,\Omega/\Omega/\,C$. **[5]**

Q.4. A wattmeter has a current coil of 0.1Ω resistance and a pressure coil of 6500Ω resistance. Calculate the percentage errors due to resistance only with each of the methods of connection (A-V & V-A), when reading the input to an apparatus which takes:

(i) $12A$ at $250V$ with unity power factor and (ii) $12A$ at $250V$ with 0.4 power factor **[6]**

P.T.O

Q.5. In a Carey-Foster bridge a resistance of 1.0125Ω is compared with a standard resistance of 1Ω, the slide wire has a resistance of 0.0250Ω in 100 divisions. The ratio arms nominally each 10Ω are actually 10.05Ω and 9.95Ω respectively. Calculate (in scale divisions) at which the balance is obtained. **[4]**