إختبارات وقياسات الكترونية

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لا إضافات

Kafrelsheikh University
Faculty of Engineering
Electrical Engineering Department
Electronics and Com. Branch
Instructor: Dr. **Bedir B. Yousif**
Third year ,First semester

Date: 3-1- 2018
Time allowed: **3 hours**
Full mark: **85 Mark**
Final term Exam: Two pages
Academic No.: ECE3006
Subject :**Electronic Measurements & Testing(1)**

- Books & notes are not allowed. * Any missing data could be reasonably assumed.
- **Course ILOS(مخرجات التعلم المستهدفة من مقرر الاختبارات والقياسات الالكترونية)**

Field	National Academic Reference Standards (NARS)			
	Knowledge & Understanding	**Intellectual Skills**	**Professional Skills**	**General Skills**
Academic standards that the course contribute in achieving it	**a.4, a. 5. , a.6 , a.8 , a.12 , a.13 a.14 , a.17, a.23 and a.26**	**b.2, b.3, b.4 , b.5 , b.6 , b.8 , b.9 ,b.11, b.12 , b14, and b.16**	**c1 , c.3 ,c.4, c.5, c.6, c.15, c.16, c.17 and c.18**	**d.1, d.3, and d.6,**

Solve all the following questions:-

Question One: (25 M)

a- **Expain** the basic requirements of a transducer?. (5 M)

b- **What** is the differences between:i. Sensor and transducer ii.LVDT and strain gauge transducers? (8 M)

c- The output of an LVDT is connected to a 5 V voltmeter through an amplifier of amplification factor 250. The voltmeter scales has 100 divisions and the scale can be read to 1/5th of a division. An output of 2 mV appears across the terminals of the LVDT when the core is displaced through a distance of 0.5 mm. **Calculate** :the sensitivity of the LVDT, that of the whole set up, and the resolution of the instrument in mm. (7 M)

d- A Maxwells inductance–capacitance bridge in Fig. 1 is used to measure a unknown inductive impedance. I- Calculate R_1, L_1 ii- The source frequency if quality factor for a coil is 3. (5 M)

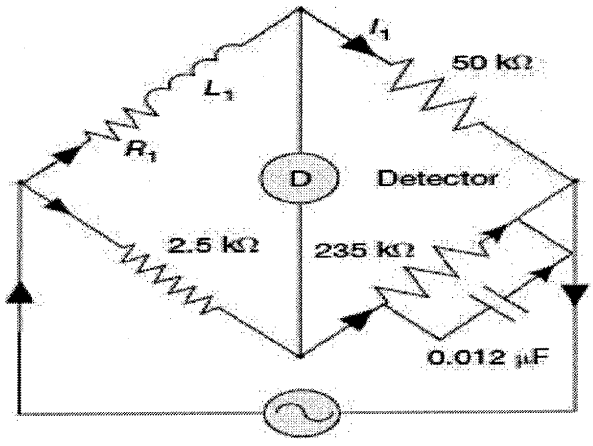

Fig. 1

Question Two: (30 M)

a- Explain an experiment to measure frequency and velocity? (7 M)

b- When the mean optical power launched into an 8 km length of fiber is 120 μW, the mean optical power at the fiber output is 3 μW. Determine: (5 M)

(i) The overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices;

(ii) The signal attenuation per kilometer for the fiber.

(iii) The overall signal attenuation for a 10 km optical link using the same fiber with splices at 1 km intervals, each giving an attenuation of 1 dB;

(iv) The numerical input/output power ratio in (c).

c- Silica optical fiber has an estimated fictive temperature of 1400 K with an isothermal compressibility of 7×10^{-11} m^2 N^{-1}. The refractive index and the photoelastic coefficient for silica are 1.46 and 0.286 respectively. Determine the theoretical attenuation in decibels per kilometer due to the fundamental Rayleigh scattering in silica at optical wavelengths of 0.63, 1.00 and 1.30 μm. Boltzmann's constant is 1.381×10^{-23} J K^{-1}. (8 M)

d- A K_2O–SiO_2 glass core optical fiber has an attenuation resulting from Rayleigh scattering of 0.46 dB km-1 at a wavelength of 1 μm. The glass has an estimated fictive temperature of 758 K, isothermal compressibility of 8.4×10^{-11} m^2 N^{-1}, and a photoelastic coefficient of 0.245. Determine from theoretical considerations the refractive index of the glass. If Boltzmann's constant is 1.381×10^{-23}. (5 M)

e- Suggest or try an experiment to explain the losses within fiber optics? (5 M)

Question Three: (30 M)

a- Explain an experiment to measure the linear displacement? (7 M)

b- State the main differences between (8 M)

i- Graded index and step index fiber.

ii-linear and nonlinear scattering.

c- Determine the cutoff wavelength for a step index fiber to exhibit single-mode operation when the core refractive index and radius are 1.46 and 4.5 μm, respectively, with the relative index difference being 0.25%. (5 M)

d- Explain two types of power losses in optical fibers and how to face these factors? (5 M)

e- Prove that the circuit in Fig. 2 work as current to voltage converter V_{out} as a function of I_{in}. (5 M)

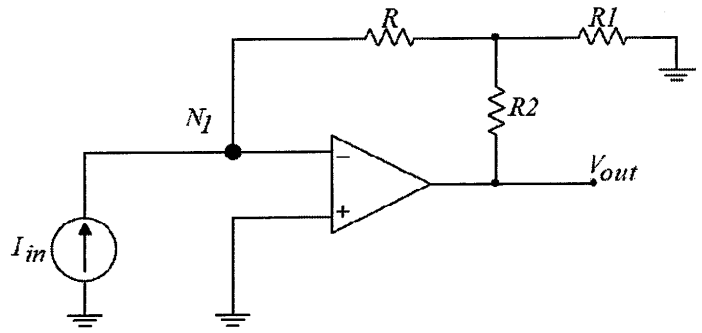

Fig. 2