



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & computer Control Engineering

Lecturer : Prof. Dr. Medhat El Singaby

Course : Electric and Magnetic Fields (2)

Course Code : EE 333

Marks : 40

Date : 26/5/2015

Time : 2 hours

Final Exam

Answer the following questions:

Question no.1

A-1

- a) use the Biot Savart Law to show that the magnetic field intensity of a straight current filament at a field point P ; shown in fig.1 ; is given by

$$\mathbf{H} = I/4\pi r (\cos \alpha_2 - \cos \alpha_1) \mathbf{a}_\phi$$

Also , determine \mathbf{H} at the point P, if this filament has infinite length, taking into consideration that $d\mathbf{L} = dZ \mathbf{a}_z$, $\mathbf{a}_z \times \mathbf{a}_R = \sin \alpha \mathbf{a}_\phi$

- b) Starting from the fact that energy stored into a coil is equal to $\int I d\lambda$;
Prove that this energy equal to $0.5 N i \Phi$; also prove that the energy per unit volume is equal to $0.5 B H$.

(10 marks)

Question no.2

B-2

- a) Define the following items:

- (i) Magnetization.
- (ii) Magnetomotive force.
- (iii) Magnetic moment.
- (iv) Inductance.
- (v) Magnetic flux over a closed surface.

- b) Consider two parallel conductors each one of 2 m length in air and spaced by a distance of 2 cm from each other. The current passing through one of the conductor is twice that passing through the other and in the opposite direction, **Determine** the distance of the points that exert zero magnetic field density in the region outside the two conductors.

Compute the flux density at a distance of one meter from the center of the lines. In addition **compute** the force acting between these two conductors.

(10 marks)

Members of Course Examination Committee:	Signature:	Date:
Lecturer: Prof. Medhat El Singaby		11/5/2015
Course Coordinator: Prof. samah El Safty		11/5/2015
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