



The Abdus Salam
International Centre for Theoretical Physics


United Nations
Educational, Scientific
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SMR 1826 - 4

Preparatory School
to the
**Winter College on Fibre Optics, Fibre Lasers and
Sensors**

5 - 9 February 2007

EXERCISE # 1 (Maxwell's Eqns. and EM Waves)

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**Preparatory School to the Winter College on Fibre Optics,
Fibre Lasers and Sensors
5th – 9th February 2007
ICTP, Trieste Italy**

EXERCISE # 1 (Maxwell's Eqns. and EM Waves)

Time: 15 minutes

Name: _____

Q. 1. A circular loop described by the equation $x^2 + y^2 = 16$ is located in the x-y plane centered at the origin. The \vec{B} field is described by

$$\vec{B} = \hat{k} 2 \sqrt{x^2 + y^2} \cos \omega t \text{ (Wb/m}^2\text{)}$$

Find total emf induced in the loop.

Q. 2. Given a Magnetic field in free space

$$\vec{B} = \hat{i}a \sin(\omega t - kx) + \hat{j}aky \cos(\omega t - kx)$$

where a, k and ω are constants. Use Maxwell's equations to derive the time dependent electric field \vec{E} .

GOOD LUCK