



Physics
Leaving Certificate
Higher Level

Past Exam Questions on
Magnets and Magnetic Fields

Q5 Part (g) Section B 2007

(g) Why does a magnet that is free to rotate point towards the North? (7)

Q9 Section B 2006

9. What is an electric current? Define the ampere, the SI unit of current. (12)

Describe an experiment to demonstrate the principle on which the definition of the ampere is based. (15)

Sketch a graph to show the relationship between current and time for

- (i) alternating current;
- (ii) direct current. (9)

The peak voltage of the mains electricity is 325 V. Calculate the rms voltage of the mains? (6)

What is the resistance of the filament of a light bulb, rated 40 W, when it is connected to the mains? (9)

Explain why the resistance of the bulb is different when it is **not** connected to the mains. (5)

Q11 Section B 2006

11. Read the following passage and answer the accompanying questions.

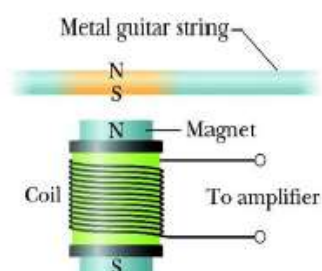
The growth of rock music in the 1960s was accompanied by a switch from acoustic guitars to electric guitars. The operation of each of these guitars is radically different.

The frequency of oscillation of the strings in both guitars can be adjusted by changing their tension. In the acoustic guitar the sound depends on the resonance produced in the hollow body of the instrument by the vibrations of the string. The electric guitar is a solid instrument and resonance does not occur.

Small bar magnets are placed under the steel strings of an electric guitar, as shown. Each magnet is placed inside a coil and it magnetises the steel guitar string immediately above it. When the string vibrates the magnetic flux cutting the coil changes, an emf is induced causing a varying current to flow in the coil. The signal is amplified and sent to a set of speakers.

Jimi Hendrix refined the electric guitar as an electronic instrument. He showed that further control over the music could be achieved by having coils of different turns.

(Adapted from Europhysics News (2001) Vol. 32 No. 4)



- (a) How does resonance occur in an acoustic guitar? (7)
- (b) What is the relationship between frequency and tension for a stretched string? (7)
- (c) A stretched string of length 80 cm has a fundamental frequency of vibration of 400 Hz. What is the speed of the sound wave in the stretched string? (7)
- (d) Why must the strings in the electric guitar be made of steel? (7)
- (e) Define magnetic flux. (7)
- (f) Why does the current produced in a coil of the electric guitar vary? (7)
- (g) What is the effect on the sound produced when the number of turns in a coil is increased? (7)
- (h) A coil has 5000 turns. What is the emf induced in the coil when the magnetic flux cutting the coil changes by 8×10^{-4} Wb in 0.1 s? (7)

Q5 Part (f) Section B 2005

(f) Draw a sketch of the magnetic field due to a long straight current-carrying conductor. (7)