

Physics Tutorial 19

Alternating Currents

1.
 - (a) What is meant by r.m.s. value of an AC?
 - (b) Write down a relationship between the r.m.s. current and the peak value for a sinusoidal alternating current.
 - (c) Calculate the peak value of a 240 V mains electricity supply.
 - (d) A sinusoidal AC of r.m.s. value 5.0 A passes through a $4.0\ \Omega$ resistor.
 - (i) What is the peak value of the current?
 - (ii) What is the mean power in the resistor?
 - (iii) What is the maximum power?

Ans: (c) 339 V, (d) 7.07 A, 100 W, 200 W

2. TYS Questions (Dyna Publisher, 1976 – 2003 edition)

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3. A 24 V, 12 W lamp is connected across the secondary coil of a transformer, the primary coil of which is connected to a 240 V A.C. supply. Given that the transformer has 100 turns in its secondary coil, calculate
 - (a) the number of turns in the primary coil.
 - (b) the current which must be provided by the 240 V supply.

State the assumptions made in your calculations in (a) and in (b).

Ans: (a) 1 000 turns, (b) 0.050 A

4. Fig 4 shows a full wave bridge rectifier. Nodes A and C are connected to a CRO.

- (a) Sketch the p.d. waveform that would appear across load resistor R .

Suppose now that a $500\ \mu\text{F}$ capacitor is connected parallel to the load resistor R .

- (b) Explain the form of the p.d.
- (c) How would the waveform be altered if the load resistance were
 - (i) $1\ 000\ \Omega$,
 - (ii) $10\ \Omega$?
- (d) Explain why the waveform would be smoother if a very large capacitor were used.
- (e) What in practice, however, limits the size of the smoothing capacitor?

