**Higher Grade Physics**

# Unit 3 : ELECTRICITY

## Monitoring & Measuring A.C.

**Peak and RMS**

1. Find the peak voltage for each of the following rms voltages :
   (a) 16 V (b) 28 V (c) 50 V (d) 1 kV (e) 10 mV

2. Find the peak currents for each of the following rms currents :
   (a) 5.0 A (b) 12 A (c) 6.3 A (d) 150 A (e) 75 μA

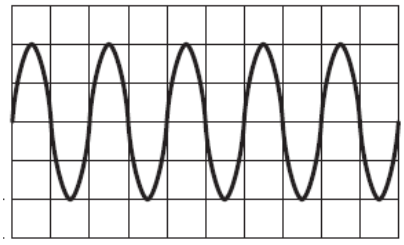
3. Calculate the rms voltage of each of the following peak voltages :
   (a) 40 V (b) 71 V (c) 500 mV

4. Calculate the rms value of the current of each of the following peak currents :
   (a) 13 A (b) 75 mA (c) 250 μA

5. The following voltages appear on the National Grid. In each case, what is the maximum voltage the insulators must be able to withstand?
   (a) on super grid transmission lines 400 kV
   (b) on grid transmission lines 133 kV

6. The "peak to peak" voltage of an alternating supply is the range from the maximum positive voltage to the maximum negative voltage.
   What is the peak to peak voltage of a 12 V rms supply?

7. The oscilloscope trace shown below shows the voltage from an ac supply.



   (a) If the oscilloscope voltage control is set at 10 V per division, calculate the peak voltage.
   (b) What is the corresponding rms voltage?

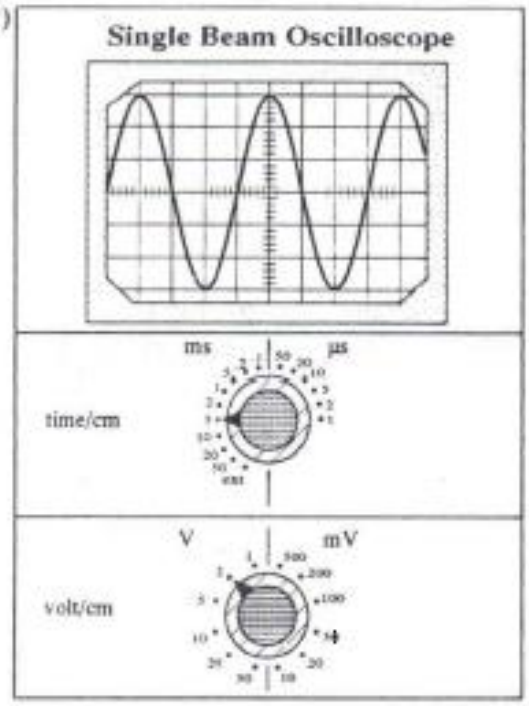
8. A filament lamp is connected to a 230 V mains supply. If the filament resistance is 960 Ω.
   (a) What is the average power dissipated in the lamp filament?
   (b) What is the instantaneous power when the supply voltage is at its peak?

9. A toaster runs off the mains electricity supply in the UK. Calculate
   (a) the number of AC cycles per second
   (b) the period of one cycle
   (c) the peak voltage
   (d) the rms current in the toaster heating element which has a resistance of 57.5 Ω
   (e) the peak current in the toaster heating element

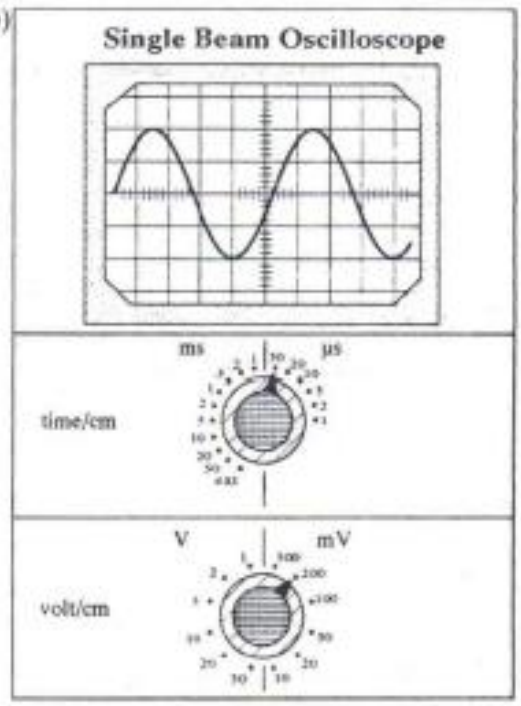
**Measuring Frequency & Voltage**

10. Each of the diagrams below shows the trace on a cathode ray oscilloscope when an alternating voltage is connected to it. For each trace find
    (i) the period (ii) the frequency (iii) the peak voltage (iv) the rms voltage

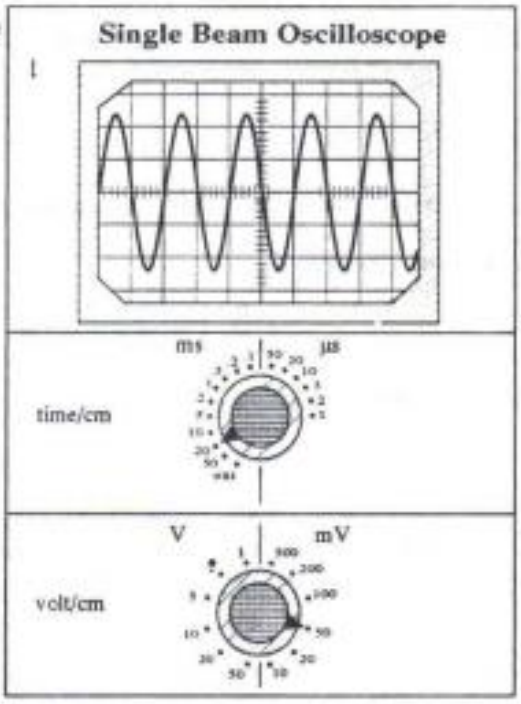
(a)



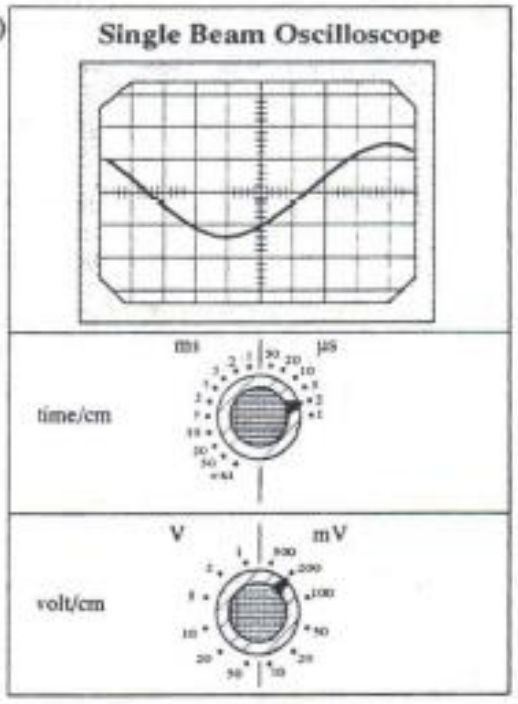

(b)



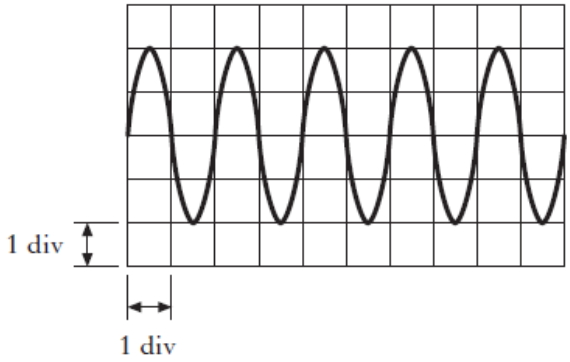

(c)




(d)

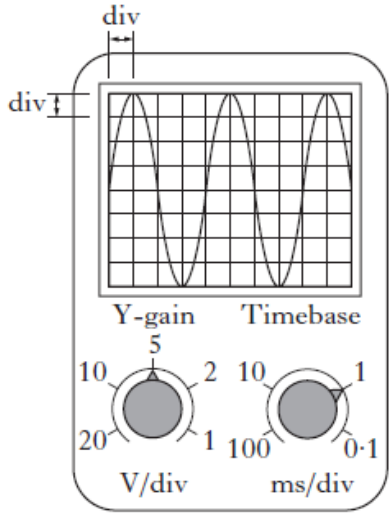


11. The output of a 50 Hz a.c. supply is connected to the input of an oscilloscope. The trace produced on the screen of the oscilloscope is shown.




What is the time-base control of the oscilloscope set at?

12. An alternating voltage is displayed on an oscilloscope screen. The Y-gain and the time-base settings are shown.




Calculate the peak voltage and the frequency of the signal.