**Introduction to Signals**

1. The frequency of a periodic signal is 20 MHz, state it's period.

5x10-8 = 0.00000005

1. A signal has a period T of 0.033 µs, state it's frequency.

303030303 Hz

1. Calculate the period of the UK's 50 Hz mains electricity supply.

0.02ns

1. Calculate the frequency of the rotation of the Earth.

60\*60\*24 = 86400 seconds 1/86400 = 0.0000115740 = 11.5740Hz

1. Calculate the frequency of the orbit of the Earth around the Sun

86400\*365 = 31536000 1/3153600 = 0.0000000317097919837645865043125 Hz

1. Calculate the angular velocity ω for the following format of vinyl records
   1. 78's

2π \* 78 / 60 = 8.17

* 1. 45's

2π \*45/60 = 4.71

* 1. LP's

LPs RPM is 33 and 1/3 so its 2π\*33\*1/3 DIVIDED BY 60 = 1.2

1. What is the instantaneous amplitude of a sinusoidal signal with period T = 5 ns and peak amplitude of 1.141 V at t = 26.8 ns.

**F(t) = Peak Amplitude \* sin(2π \*(1/T) \* 1/T)**

1.141 \* sin(2π\*(1/5x10-9)\*26.8x10-9) = 0.87915561

1. Calculate for a sinusoidal signal with an angular velocity of 314.1593 radians/s and a peak voltage of 340 V
   1. The instantaneous amplitude at t = 15 ms

1.60

* 1. The amplitude at an angular rotation of 7.0669 radians.

3.604119x10-5

* 1. The period of the signal

27746.03169

* 1. The frequency of the signal.

6 recurring .67

1. BBC Radio 4 transmits on 93.5 MHz FM and 198 kHz LW. Calculate the wavelengths at which the signals are broadcast.

Wavelength=speed of light3x108/frequency.

3.20 for 93.5 MHz

1515.15 for 198 kHz

1. The BBC world service transmits in the short wave radio spectrum to Western Europe at wavelength 31.8589 m. Calculate the frequency the signal is transmitted at.

29978807150/31.8589 = answer

1. Calculate the period T for a signal in the ultra violet with a wavelength of 450 nm

3x108 divided by 450x10-9 = 6.7x10 6

1. What bandwidth would be required to transmit the following signal v(t)?

v(t) =  cos(2.π.f.t) - cos(6.π.f.t) + cos(10.π.f.t)

If the available transmission bandwidth were to be decreased by 30%, what would happen to the signal

Would be weak signal

<http://staffweb.cms.gre.ac.uk/~sp02/introductiontosignals/6302solutions.htm>