(30) 1. Signals, Fourier series, transfer functions, frequency response: (t in seconds)
(05) a. For the signal \(100\cos(14\pi t)\), specify each of the following: (i) rms amplitude;
(ii) peak-to-peak amplitude (iii) period (iv) frequency in Hz (v) frequency in radians/second.

(05) b. For the signal \(x(t) = \cos(2\pi t) + 20\cos(6\pi t) + 400\cos(10\pi t)\), specify following:
(i) period (ii) fundamental frequency in Hz (iii) harmonics frequencies in Hz.

(10) c. \(x(t)\) is input into a system with phase response \(-\pi\) and gain \(G(f) = \left\{ \begin{array}{ll}
1 & \text{for } 0 < f < 4Hz \\
0 & \text{for } 4Hz < f < \infty
\end{array} \right. \)
Compute the output of the system.

(10) d. \(x(t)\) is input into a system with the gain and phase responses plotted below.
Compute the output of the system.

(40) 2. Simple circuits, circuit elements and power:
(05) a. A 12V source is connected across a 10Ω resistor and 5Ω resistor in series.
What voltage would an ideal voltmeter measure across the 10Ω resistor?

(15) b. Combine each of the following into a single equivalent source or resistor:
Explain your reasoning briefly for each circuit in the blank space below.

(i) 
(ii) 
(iii) 

(20) c. For the circuit shown at right compute the power dissipated by each resistor and source.
Show that power is conserved.