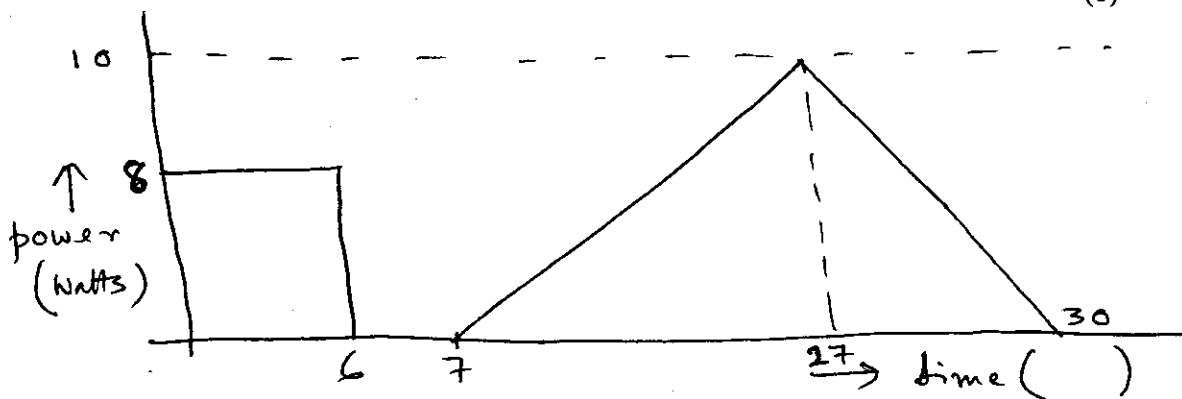**B.CSE 1ST YR 2ND SEM. EXM.2016**

CIRCUIT THEORY

Time: 3 Hours

Full Marks: 100

Answer any *five* questions

1. (a) The power supplied by a battery is a constant 8W over the first 6 minutes, and then as shown in the diagram.

  (i) What is the total energy in Joules expended during the 30 minutes interval?

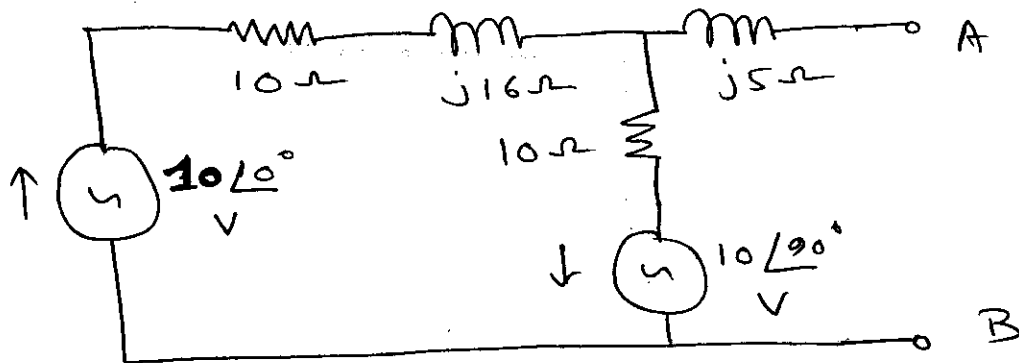 (ii) What is the average power in watts during this total time? (6)

(b) Apply Superposition Theorem to find i_x in the given circuit. (10)
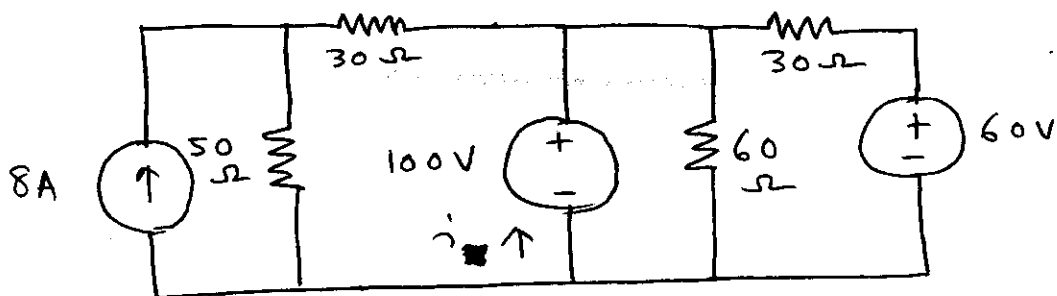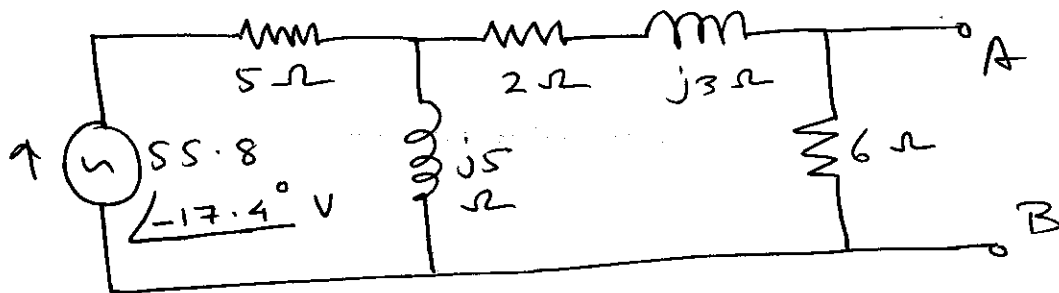

2.(a) Find V_2 such that the current through the $(2+j3)\,\Omega$ impedance is zero. (10)
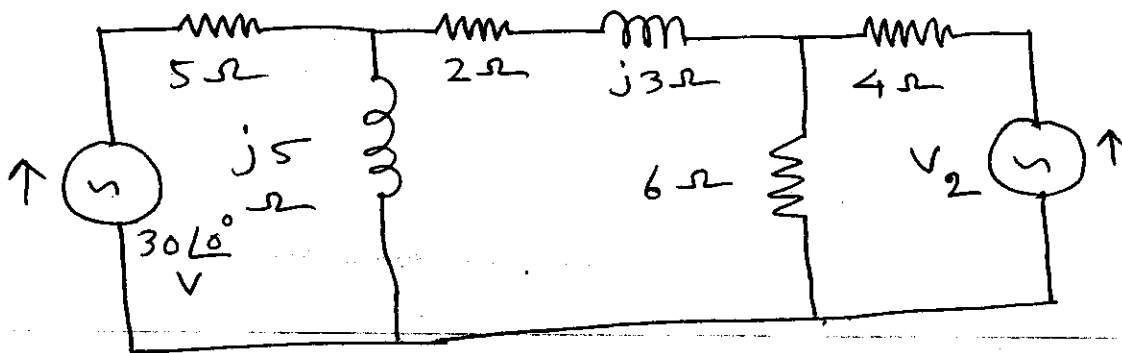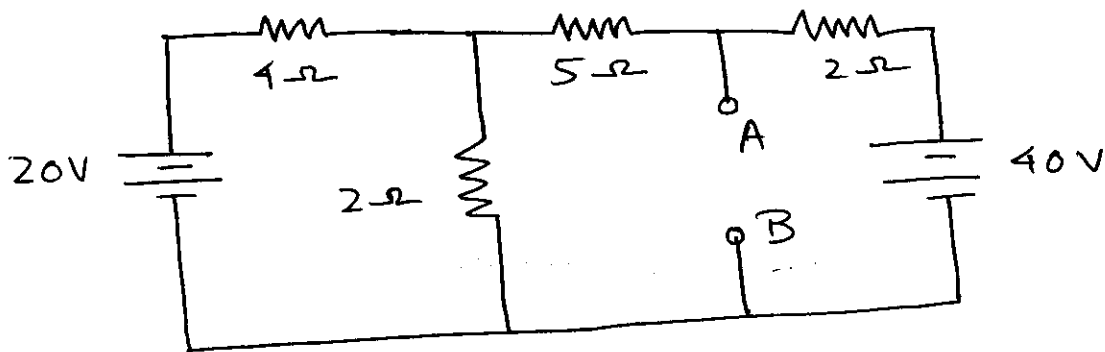
2.(b) Find the Thevenin equivalent circuit at terminals AB in the given circuit.   (10)

3.(a) Find the Norton equivalent circuit across AB.   (10)

(b) Find the Thevenin and Norton equivalent circuits across AB in the given circuit.   (10)

(2)

4. (a) A series circuit with R = 10 Ω has an impedance with an angle of 45° at a frequency, f = 500 Hz. Find the frequency for which the magnitude of the impedance is: (10)

i) twice of that at f

ii) one-half of that at f.

(b) For the given network, find (i) the resonant frequency, w_o and (ii) the input impedance $z_{in} (jw_o)$.

(10)
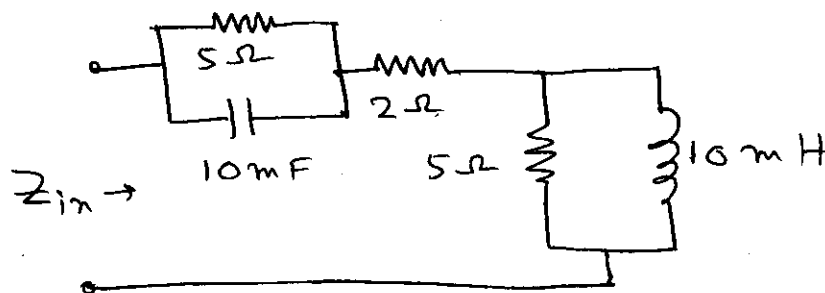
5.(a) What is the basic function of a filter circuit? How many types of filter circuits are there? Draw the ideal and practical input-output characteristics curves for (i) LPF (ii) BPF. Explain the reason for the difference in the shapes of the ideal and practical curves. (7)

(b) Select a suitable value for the resistance for an RC filter circuit such that it will filter out any noise above 20 Hz and pass the electrical signals at about 10 Hz. For an input voltage of 1Volt, find the output voltages at 10 Hz, 20 Hz and 40 Hz. $[C = 1 \mu F]$ (8)

(c) For a HPF, the roll-off rate is 6dB/octave and the cut-off frequency is 4 KHz. If the output for a signal of frequency 1 KHz is 0.10 volt, find the outputs for 2 KHz and 3 KHz. (5)

6. (a) Find the Laplace Transforms of :

(i) df/dt ; (ii) $\int f(t) \, dt$; (iii) $f(t) = e^{at}$ (10)

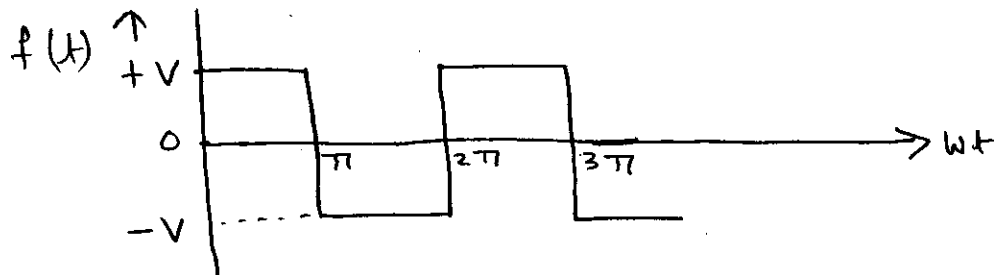(b) Find the mesh currents by Laplace Transform method. (10)

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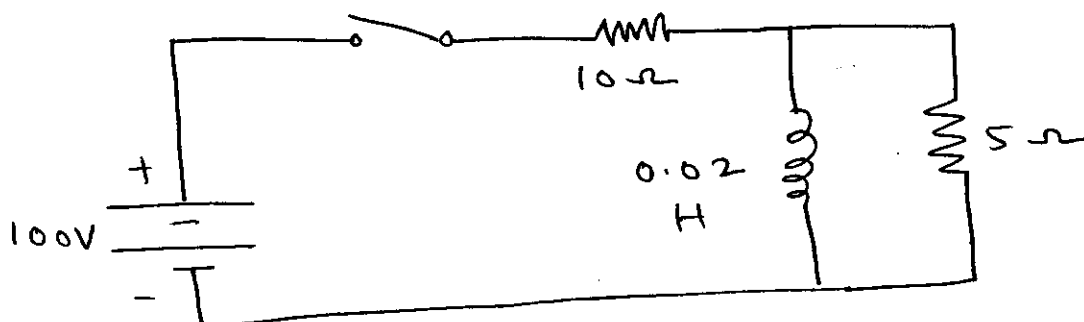
7.(a) Define odd and even functions from the definitions of Fourier Series. (10)
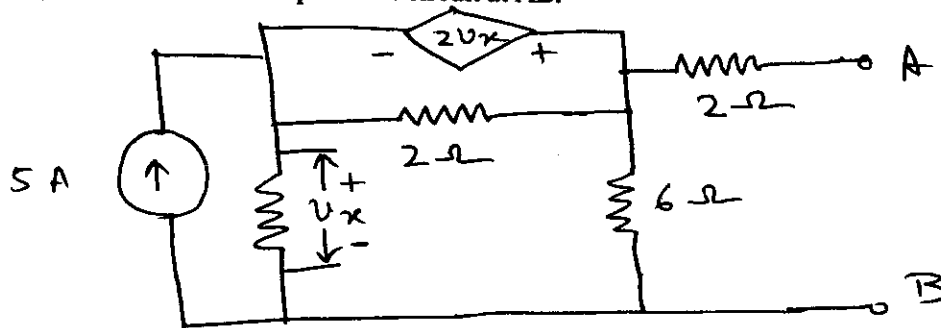
Explain which are odd and which are even functions.

(i) $f(x) = 2+x^3+x^4$; (ii) $f(x) = \sin x$; (iii) $f(x) = \cot x$; (iv) $f(x) = x+x^3$

(b) Find the Trigonometric Fourier series for the given waveform and plot the line spectrum. (10)

8.(a) Find the Thevenin equivalent circuit at AB. (10)

(b) Find out V_{AB} given that the voltage across 5 ohm resistor is 45 volts. (10)

— X —

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