MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
MAE-UP EXAMINATIONS, JANUARY 2023

ELECTRICAL CIRCUIT ANALYSIS [ELE 2153]

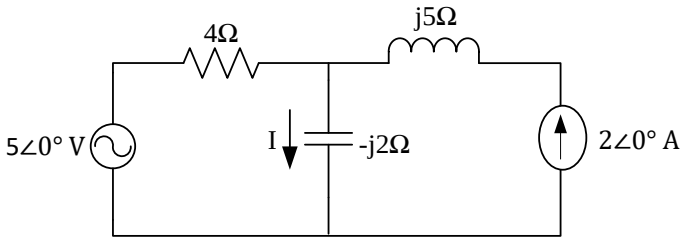
REVISED CREDIT SYSTEM

Time: 3 Hrs. **Date: January 2023** **Max. Marks: 50**

Instructions to Candidates:

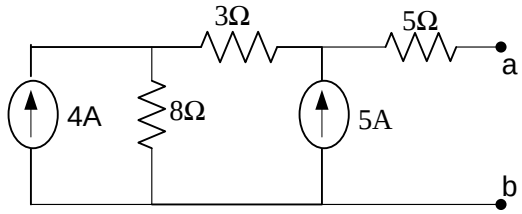
- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Determine the current 'I' using superposition theorem



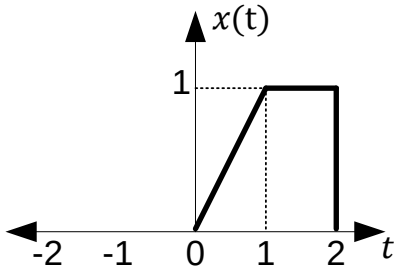
(03)

1B. Find the Norton's equivalent circuit for the circuit below



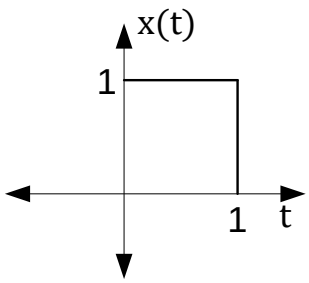
(03)

1C. For the signal $x(t)$ shown, sketch the signal $2x\left(\frac{t}{2}-1\right)$



(04)

2A. Find the even and odd component of signal $X(t)$.

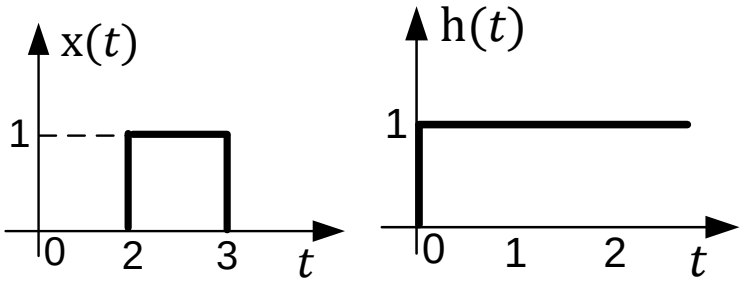


(03)

2B. Find the fundamental period of the signal given below.

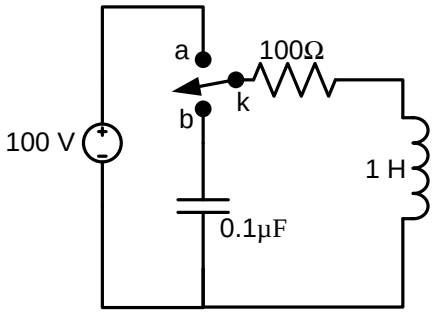
$$x(t) = \sin\frac{6\pi}{7}t + 3\sin 4\pi t + 2\sin\frac{6\pi}{5}t$$ ***(02)***

2C. Determine the output response $y(t)$, when the impulse response $h(t)$ for an input $x(t)$ is as shown in Fig.



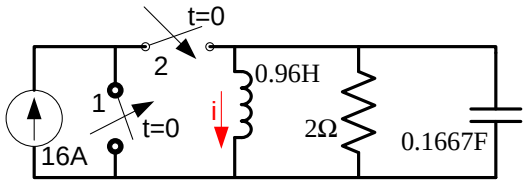
(05)

3A. In the network shown, the switch 'K' is changed from position a to b at t =0. Solve for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ if R =100 Ω, L = 1H, C= 0.1 μF and V =100 V.



(03)

3B. Switch 1 and switch 2 operates synchronously and is complementary (s1 on → s2 off and s2 on → s1 off). Switch1 has been closed for a long time and at t=0s, switch 1 is open, Find i(t) for t>0



(04)

3C. In the network shown, switch is changed from A to B at t = 0. Find the current through the capacitor using Laplace Transform method

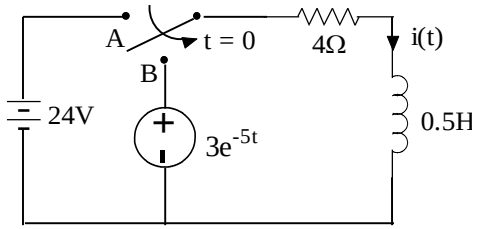
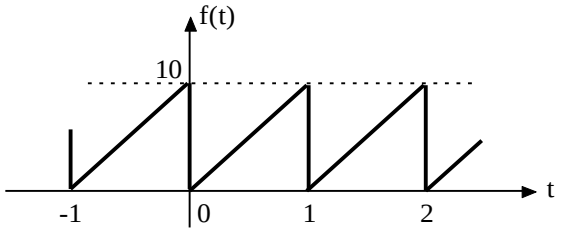


Fig. 3A

(03)

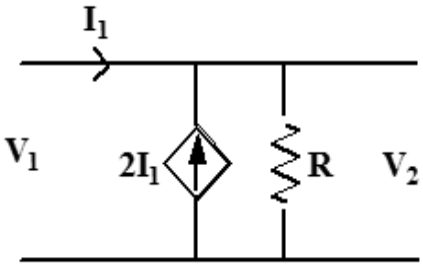
4A. Write the Trigonometric Fourier Series of the waveform shown. Also, plot the magnitude and phase spectra. ***(05)***



4B. Consider a periodic signal $x(t)$ with $\omega_o = 2\pi$ and $a_o = 1$; $a_1 = a_{-1} = \frac{1}{4}$; $a_2 = a_{-2} = \frac{1}{2}$; $a_3 = a_{-3} = \frac{1}{3}$; Give the Fourier series representation in exponential and also in trigonometric form. ***(03)***

4C. Obtain the Fourier transform of signal $x(t) = e^{-at}u(t); a > 0$ ***(02)***

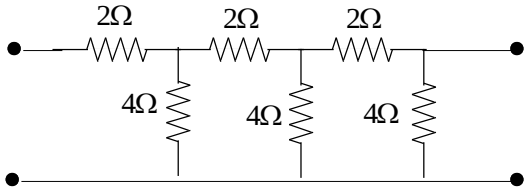
5A. Derive the h-parameters of the network given below.



(02)

5B. A two port network is defined by the parameters: $Y_{21} = 6$, $Y_{22} = 8$, $h_{11} = 5$, $h_{12} = 2$. Find the T parameters. ***(03)***

5C. Decompose the network shown into two, 2 port networks connected in cascade and hence find the overall Z parameters.



(05)