Code No: 182AF **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, September - 2023
ELECTRICAL CIRCUIT ANALYSIS – II
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a) The steady state current through 1 H inductor in the circuit shown in the given Figure 1 [1]

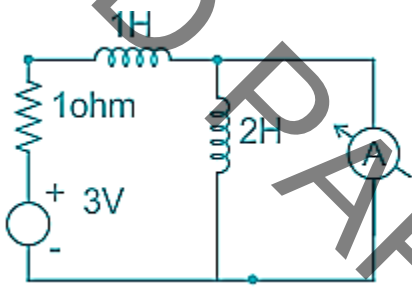

Figure 1

b) Time constant of the network shown in the Figure 2. [1]

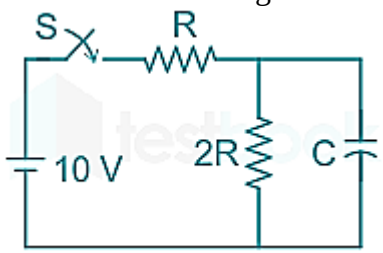

Figure 2

c) Laplace transform $e^t \sin(t)$ is_____ [1]

d) The transfer function of the system is given by H(s) =$\frac{1}{s^2\,(s-2)}$. The impulse response of the system is [1]

e) A 2-port network is represented by the following equations
$V_1 = 60I_1 + 20I_2$
$V_2 = 20I_1 + 40I_2$
The B and C parameters of the above network would be [1]

f) A, B, C and D represent the transmission parameters of a two-port network. When is the network reciprocal? _____ [1]

g) How is the exponential Fourier series for the function X(t) represented? [1]

h) What is Fourier series? [1]

i) The representation of periodic signals in a mathematical manner is called a Fourier series

ii) The representation of non-periodic signals in a mathematical manner is called a Fourier series

iii) The representation of non-periodic signals in terms of complex exponentials or sinusoids is called a Fourier series

iv) The representation of periodic signals in terms of complex exponentials or sinusoids is called a Fourier series

i) Find the cut off frequency for an RC low pass filter of R=8.2Ω and C=0.0033μF? [1]

j) What is M-derived filter? [1]

PART - B

(50 Marks)

2. In the given circuit (Figure 3), switch K is closed at time t=0. Obtain the expression for the current i(t). [10]

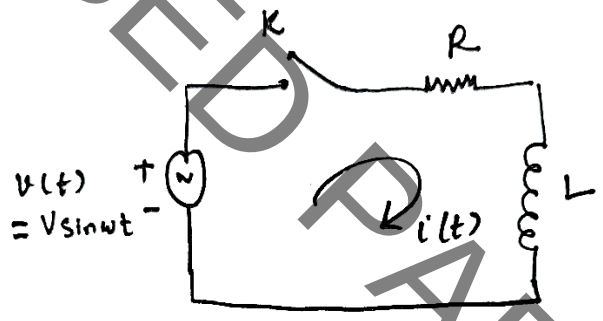

Figure 3

OR

3.a) What do you mean by transient response of the electrical network? Explain time constant case of parallel RC circuit. Also explain in brief about the step response of parallel RC circuits.

b) Further in the given circuit (Figure 4) switch K is closed at t=0. Find the values of i, di/dt at $t=0^+$. Given that V_o =10 volts, R= 100 ohms and C=1μF [5+5]

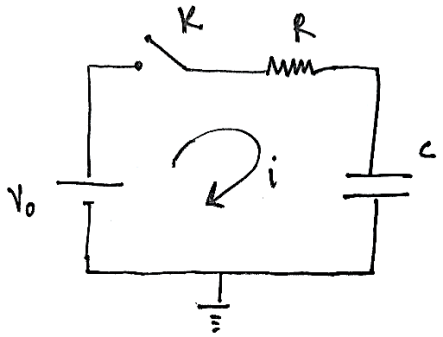

Figure 4

4. Find the response current of a series R-L circuit consisting of resistor R= 3 ohms and inductor L=1 Henry when each of the following driving force voltage is applied.
a) Unit ramp voltage r(t-2)
b) Unit impulse voltage δ (t-2)
c) Unit step voltage u(t-2)
d) pulse of width "a" and magnitude 1 volt beginning at time t=2. [10]

OR

5. Find the current i(t) in a series RC circuit consisting of R = 2 Ohms and C=1/4 Farad when each of the following driving force is applied
a) ramp voltage 2r(t-3)
b) step voltage 2u(t-3)
c) impulse voltage 2δ(t-3). [10]

6. Find the Z parameters for the resistive network shown in Figure. 5. [10]

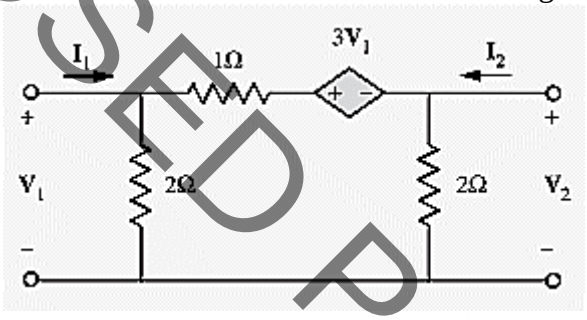

Figure. 5

OR

7. Find the y parameters for the two-port network shown in Figure. 6. [10]

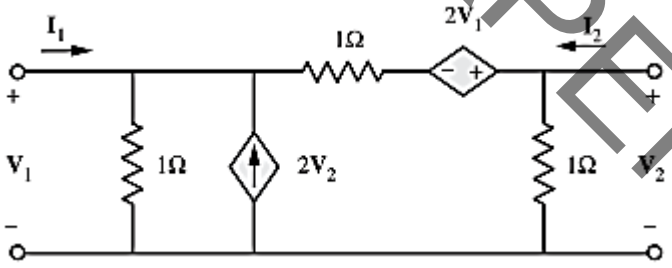

Figure. 6

8. Find out the fourier series of the following function shown in the Figure.7. [10]

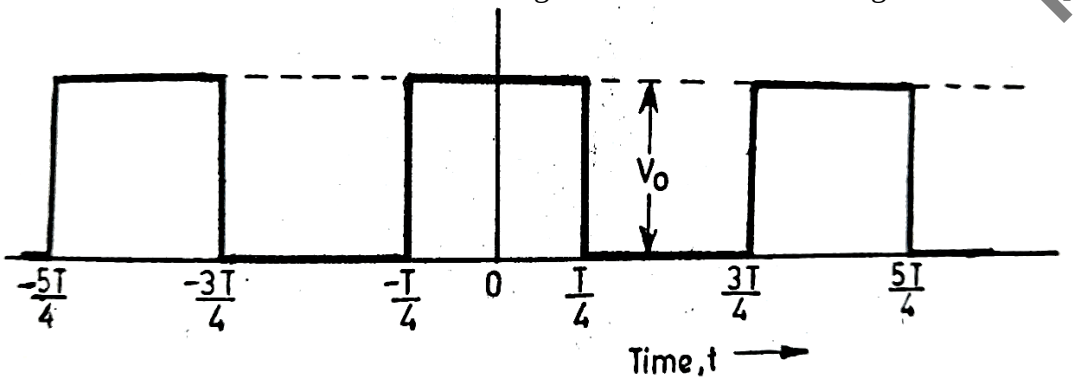

Figure.7

OR

9. The following figure 8 shows a periodic voltage waveform. Determine the Fourier coefficients and plot the corresponding amplitude and frequency spectra. [10]

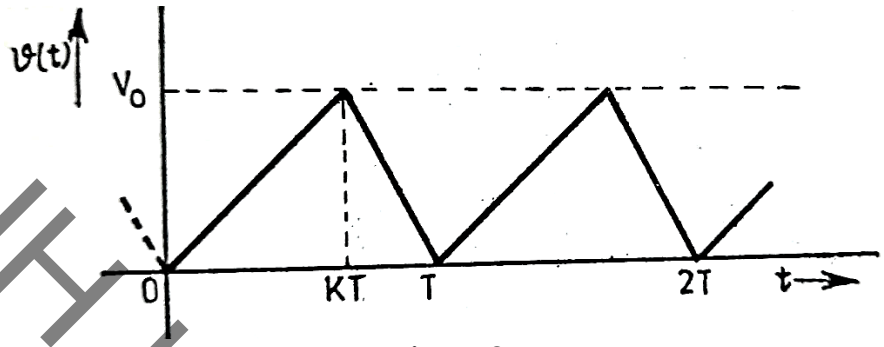

Figure 8

10.a) Design a High –pass filter having a cut-off frequency of 1kHz with a load resistance of 600 Ω.

b) Design a Band-elimination filter having design impedance of 600Ω and cut-off frequencies f1= 2 kHz and f2= 6 kHz. [5+5]

OR

11.a) Explain in detail about classification of filters.

b) Explain about Propagation constant and characteristic impedance in T-network filters. [5+5]

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