Printed Pages:04 **Sub Code:KEC-303**

Paper Id: 233537 **Roll No.** | | | | | | | | | | |

B.TECH

(SEM III) THEORY EXAMINATION 2022-23

NETWORK ANALYSIS & SYNTHESIS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

(a) Obtain the voltage v_o in the circuit of fig.1.

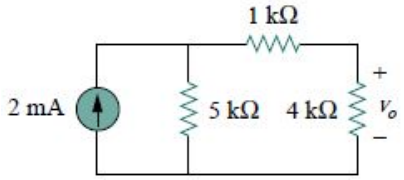

fig.1

(b) Find the power delivered to an element at t=3ms if the current entering its positive terminal is i=5cos(60πt) A and voltage is v =$3\frac{di}{dt}$

(c) State Dirichlet's conditions for a function to be expanded as a Fourier series.

(d) Express the current pulse in fig.2in terms of the unit step.

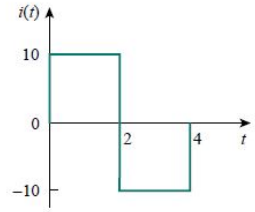

fig.2

(e) What is the condition for two port network to be reciprocal?

(f) Differentiate between line voltage and phase voltage in three phase circuit.

(g) Define initial and final value theorem.

(h) Explain steady state response and transient response.

(i) State Reciprocity theorem.

(j) State Tallegen's theorem

SECTION B

2. Attempt any *three* of the following: **10x3=30**

(a) Explain the duality principle and Construct the dual of the circuit in fig. 3

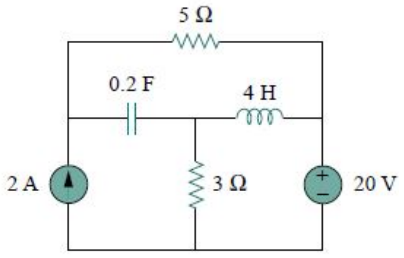

fig.3

(b) Explain Superposition theorem and also Calculate v_o in the circuit of fig.4 Using Superposition theorem.

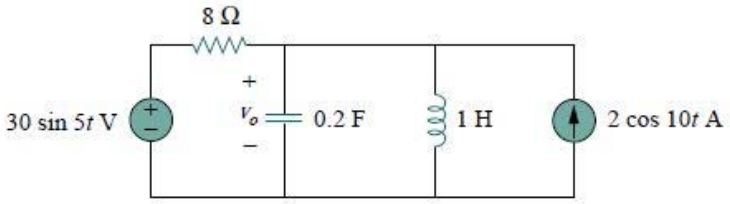

fig.4

(c) Find the response $v_o(t)$ if the sawtooth Waveform in fig.5 is the voltage source $v_s(t)$ in the circuit of fig.6

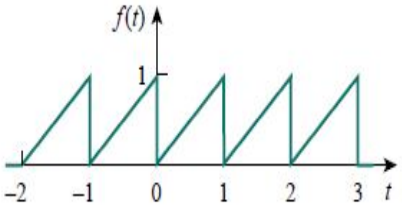

fig.5

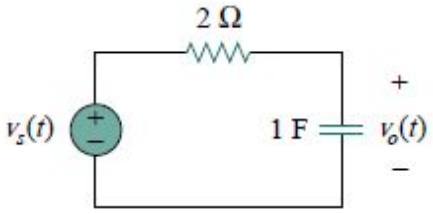

fig.6

(d) Explain the properties of Laplace transform and determine the Laplace transform of $f(t)= \cos(2t) + e^{-3t}$, $t \geq 0$.

(e) Explain the following terms with respect to source free series RLC circuit:
(i) overdamped
(ii) underdamped
(iii) critically damped
(iv) undamped natural frequency and damping frequency

SECTION C

3. Attempt any *one* part of the following: 10x1=10

(a) Explain source transformation method and Find i_o in the circuit of fig.7 using source transformation.

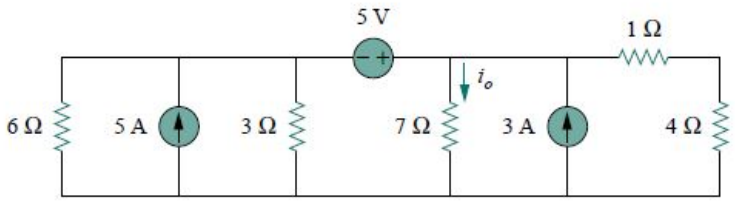

fig.7

(b) Determine the Voltages at Nodes in fig. 8

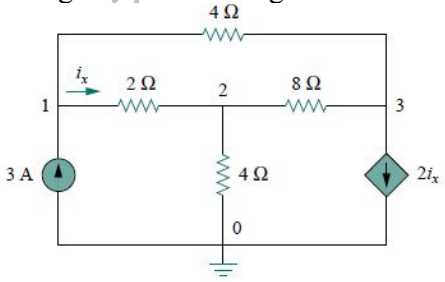

fig.8

4. Attempt any *one* part of the following: 10x1=10

(a) Explain Thevenin theorem & find the Thevenin equivalent at terminals a-b of the circuit in fig.9

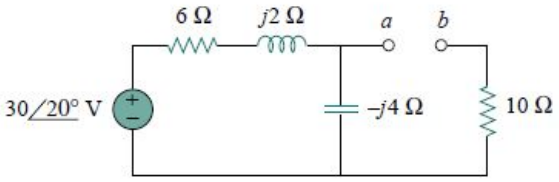

fig.9

(b) Explain Norton theorem and Obtain current i_o in the fig.10 using Norton theorem.

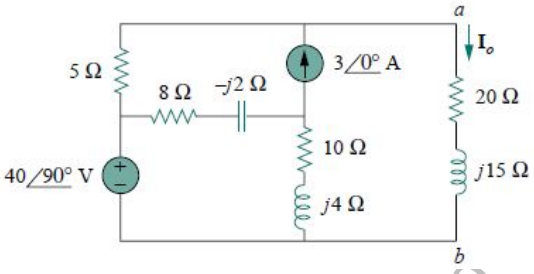

fig.10

5. Attempt any *one* part of the following: 10x1=10

Find the Fourier series of square wave if fig.11 and Plot amplitude and phase spectrum.

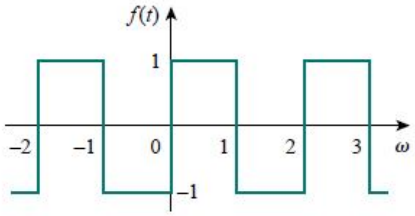

fig.11

Find the Fourier transform of single rectangular pulse of the circuit in fig. 12

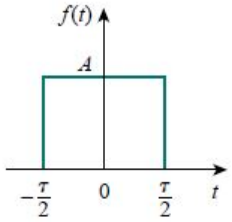

fig..12

6. Attempt any *one* part of the following: 10x1=10

(a) Obtain mesh currents in the circuit of fig.13 by means of Laplace transform

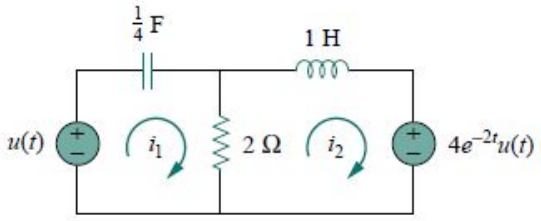

fig.13

(b) Determine the inverse Laplace transform of each of the following functions:

(i) $\frac{8(s+1)(s+3)}{s(s+2)(s+4)}$ (ii) $\frac{s^2-2s+4}{(s+1)(s+2)^2}$

7. Attempt any *one* part of the following: 10x1=10

(a) Explain two port network and determine the z parameter of two port network shown in fig .14

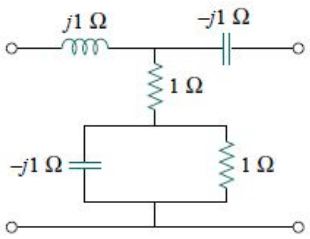

Fig.14

(b) Explain the following passive filters :
(i) Low Pass filter
(ii) High pass filter
(iii) Band pass filter
(iv) Band stop filter