

II B. Tech I Semester Regular Examinations, March - 2021
ELECTRICAL CIRCUIT ANALYSIS - II
 (Electrical and Electronics Engineering)

Time: 3 hours

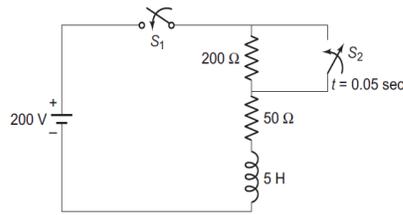
Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit
 All Questions carry **Equal** Marks

- 1 a) Derive the relation between line and phase quantities in star connected system with necessary diagrams (6M)
- b) A balanced delta connection contains an inductor of 1.4 H with a parallel combination of 12- μ F capacitor and 64-ohm resistor. If a supply of 400 V at a frequency 360 rad/sec is given to the load, then find, phase current, line current, and the power delivered. (9M)

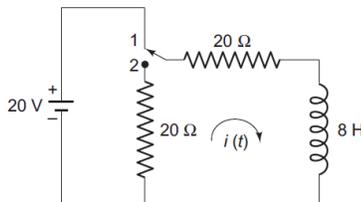
Or

- 2 a) Explain the effect of power factor on wattmeter readings of power measurement. (6M)
- b) If $Z1 = (3 - j7) \Omega$, $Z2 = (5 - j7) \Omega$, $Z3 = (10 + j5) \Omega$ and the supply voltage as 440 V. Find line and phase currents as well as power absorbed when the impedances are connected in delta. (9M)
- 3 a) Why the voltage drop across the capacitor does not change instantaneously (5M)
- b) In the circuit shown in below Figure, switch S_1 is closed at $t = 0$ and S_2 is opened at $t = 0.05$ sec. Find the transient current using differential equations. (10M)

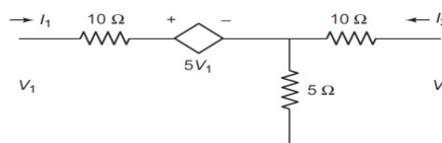


Or

- 4 a) What are the merits of Laplace transformation to electrical circuits (5M)
- b) In the circuit shown in below the switch is moved from 1 to 2 at time $t = 0$. The steady-state current having previously established in the $R-L$ circuit, find the expression for the current $i(t)$ after switching using Laplace transform. (10M)

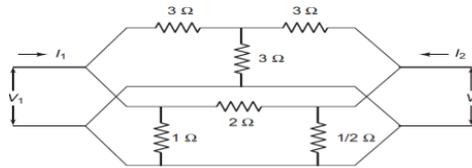


- 5 a) Derive the necessary expression for obtaining the open circuit impedance parameters and draw its equivalent representations (6M)
- b) Find ABCD parameters of the network shown in below Figure (9M)



Or

- 6 a) Obtain the relation between hybrid parameter to impedance parameters (5M)
- b) Find the Y-parameters of the network shown in below Figure (10M)

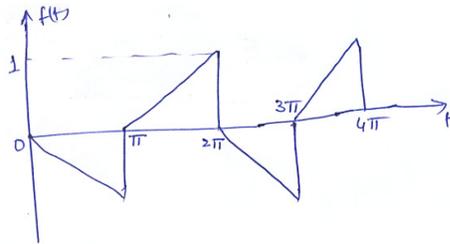


- 7 a) State and prove the even and odd symmetry (6M)
- b) A series RL circuit in which $R = 10 \text{ ohm}$ and $L = 0.05\text{H}$ has an applied voltage $v(t) = 100 + 40 \sin \omega t + 20 \sin 3\omega t$ volts. Find $v_o(t)$ and average power. (9M)



Or

- 8 Find exponential Fourier series of the wave form shown in below figure (15M)



- 9 a) Explain the physical significance of the Fourier transform (5M)
- b) Find the Fourier transform of the following signals (10M)
 - (i) $F(t) = \delta(t)$ and (ii) $f(t) = e^{-at}u(t)$

Or

- 10 Find the Fourier transform of $f(t) = e^{-at-t} \big|_0$. Plot the continuous spectrum of amplitude and phase. (15M)

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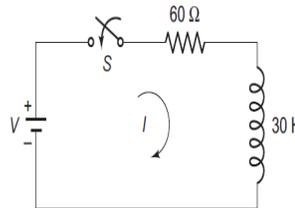
Answer any **FIVE** Questions each Question from each unit
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- 1 a) Derive the relation between line and phase quantities in delta connected system with necessary diagrams [6M]  
 b) A balanced mesh connected load of  $(12 + j9)$  ohm per phase is connected to a three phase, 400 V supply. Find (i) line current, (ii) power factor, (iii) power, (iv) reactive volt-amperes and (v) total volt amperes. [9M]

Or

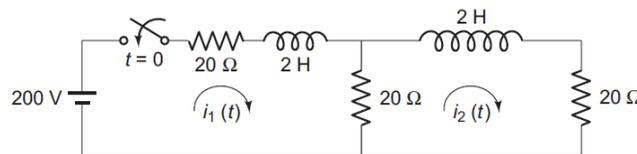
- 2 a) Derive the expression for power factor using two-watt meters method. [6M]  
 b) A 3-phase, 4-wire, 400 V, AC system supplies a star-connected load in which  $Z_A = 10 \angle 0^\circ$  ohm,  $Z_B = 15 \angle 30^\circ$  ohm and  $Z_C = 10 \angle -30^\circ$  ohm. The phase sequence is ABC. Find currents and power absorbed. [9M]

- 3 a) What are the initial conditions? Why are they necessary [5M]  
 b) A series R-L circuit with  $R = 60$  ohm and  $L = 30$  H has a constant voltage  $V = 120$  V applied at  $t = 0$  as shown in below Figure. Determine the current  $I$ , the voltage across resistor, and the inductor using differential equations. [10M]

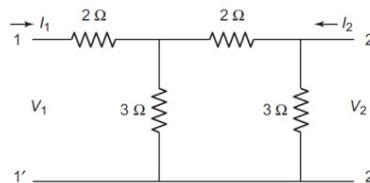


Or

- 4 a) Derive the expression for  $i(t)$  and capacitor voltage  $V_C(t)$  for series RC circuit at  $t=0$ . Also explain the time constant of RC circuit [5M]  
 b) In the network shown in below Figure, the switch is closed at  $t = 0$ . Find the values of  $i_1(t)$  and  $i_2(t)$  assuming zero initial currents through inductors using Laplace transforms. [10M]



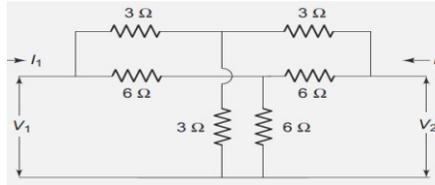
- 5 a) Derive the necessary expression for obtaining the short circuit admittance parameters and draw its equivalent representations [5M]  
 b) Find the Z-parameters of the network shown in below Figure [10M]



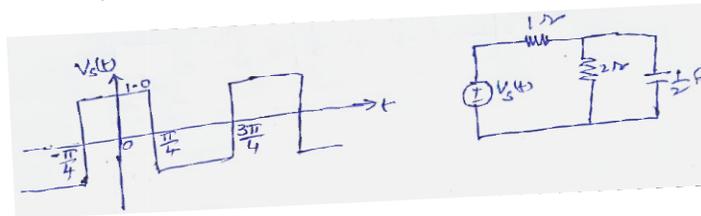
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- 6 a) Obtain the relation between inverse hybrid parameter to impedance parameters [5M]
- b) Determine the Y-parameters of the two T-networks connected in parallel as shown in below Figure [10M]

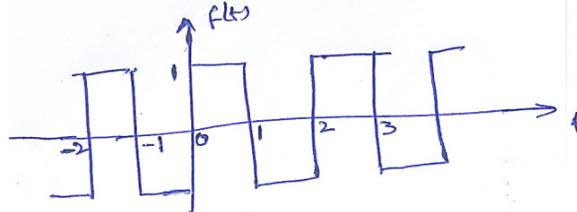


- 7 a) Derive the expression for exponential Fourier series [5M]
- b) If the input voltage  $v_s(t)$  is applied to the network shown in fig(b). Find the expression for steady state current. [10M]



Or

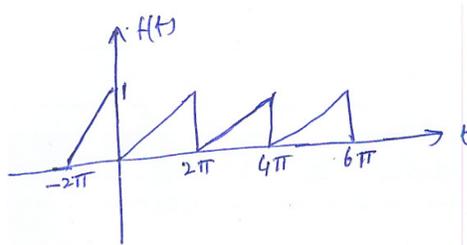
- 8 Find cosine Fourier series representation for the signal shown in the below figure. [15M]



- 9 The voltage across a 50 ohm resistor is given by  $v(t) = 4t e^{-t}$  volts for  $t \geq 0$   
 $= 0$  for  $t \leq 0$  [15M]  
 Find the percentage of the total energy dissipated in the resistor associated with the frequency band of  $0 \leq \omega \leq \sqrt{3}$  rad/sec

Or

- 10 Find the Fourier transform of the periodic function shown in below figure. [15M]



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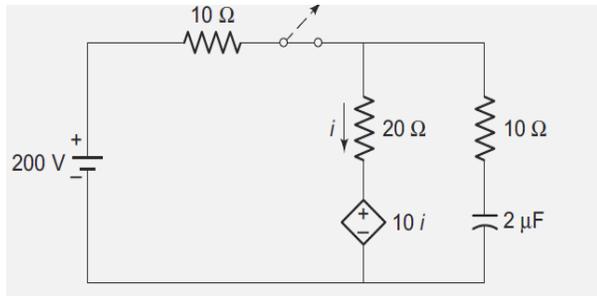
Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit  
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- 1 a) What do you understand by phase sequence and give its significance [6M]  
 b) A balanced delta connection with load impedance of  $(2 + j3)$  per phase is connected to a balanced three-phase 440 V supply. Find active, reactive, and apparent powers if phase current is 10 A. [9M]

Or

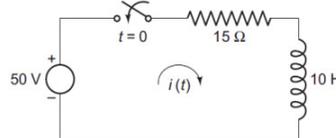
- 2 a) When the network become unbalance? How it will be solved [5M]  
 b) A 3-phase, 3-wire star connection having loads  $(1 + j2)$  ohm,  $(3 + j4)$  ohm, and  $(5 + j3)$  ohm and the supply voltage is 440 V. Determine line currents, line voltages, phase currents, and phase voltages. [10M]
- 3 a) Why cannot the current in a pure inductor change in zero time [5M]  
 b) For the circuit shown in below Figure, find the current equation when the switch is opened at  $t = 0$  using differential equations.



[10M]

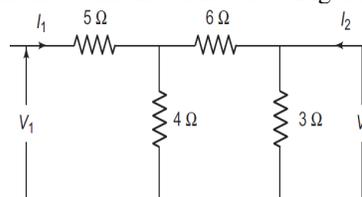
Or

- 4 a) A series RL circuit is supplied by DC voltage. Find the expression for  $i(t)$  when the switch is closed at  $t = 0$ . Draw the characteristics of  $i(t)$  vs  $t$  and define the term time constant. [6M]  
 b) Assume zero initial conditions and find  $i(t)$  in the circuit using Laplace transforms as shown in below Figure



[9M]

- 5 a) Explain how do you determine the transmission parameters of a two part network. [5M]  
 b) Determine Y-parameters of the network shown in below Figure

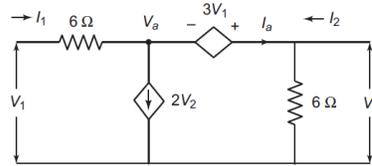


[10M]

Or

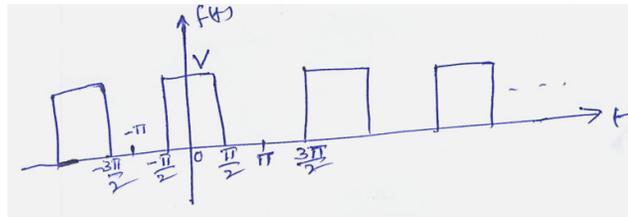
6 a) Obtain the relation between Y and Z parameters [5M]

b) Find the transmission parameters of the network shown in below Figure



7 a) Derive the expression for evaluation of Fourier coefficients [10M]

b) Find Cosine representation using Fourier series for the signal shown in below figure [5M]



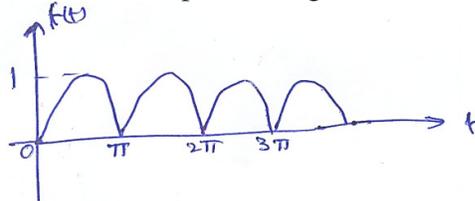
[10M]

[5M]

[10M]

Or

8 Find the trigonometric series for the periodic signal f(t) shown in below figure



[15M]

9 State and explain the properties of Fourier transform [15M]

[15M]

Or

10 Determine the Fourier transform for a signal waveform described by the equation  $F(t) = (1 + m \cos \omega_1 t) \cos \omega_0 t$ , for all t and sketch the amplitude and phase spectra [15M]

[15M]

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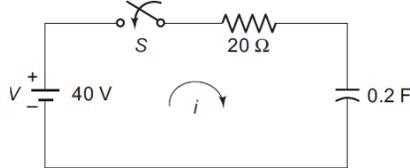
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Answer any **FIVE** Questions each Question from each unit  
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- 1 a) What are the merits and demerits of polyphase system over a single-phase system [6M]  
 b) A three-phase, three-wire, 400 V system supplies a balanced delta-connected load with impedances of  $20\angle 45$  ohms. Determine the line current and draw the phase diagram. [9M]

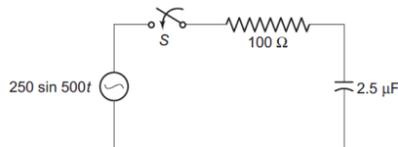
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- 2 a) Explain about the power measurement in a 3-phase circuit using two wattmeter method with neat diagram [7M]  
 b) A symmetrical 440 V, 3-phase system supplies a star-connected load with the following branch impedances:  $Z_R = 10$  ohm,  $Z_Y = j5$  ohm, and  $Z_B = - (j6)$  ohm. Calculate voltage drop across each branch. The phase sequence is RYB. [8M]
- 3 a) Explain the importance of time constant of RL circuit. What are the different ways of defining it. [5M]  
 b) A series R-C circuit consists of a resistor of 20 ohm and a capacitor of 0.2 F as shown in below Figure. A constant voltage of 40 V is applied to the circuit at  $t = 0$ . Obtain the current equation using differential equations. Also, determine the voltages across the resistor and the capacitor. [10M]

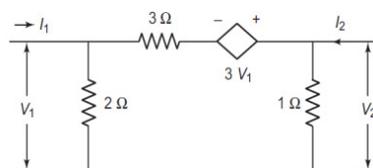


Or

- 4 a) Distinguish between classical and Laplace transform method of solution of a network [5M]  
 b) A series R-C circuit with  $R = 100$  ohms and  $C = 2.5 \mu F$  as shown in below Figure, has a sinusoidal voltage  $250 \sin 500t$ . Find the current using Laplace transforms assuming that there is no initial charge on the capacitor. [10M]



- 5 a) Explain how do you determine the hybrid parameters for a two part network. [5M]  
 b) Find Y-parameters for the network shown in below Figure. [10M]

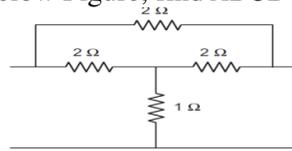


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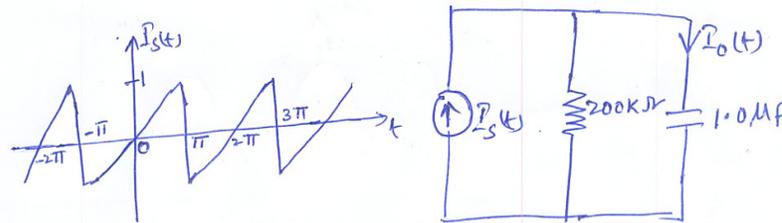
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- 6 a) Express Y-parameters in terms of ABCD parameters [5M]
- b) For the network shown in below Figure, find ABCD parameters. [10M]

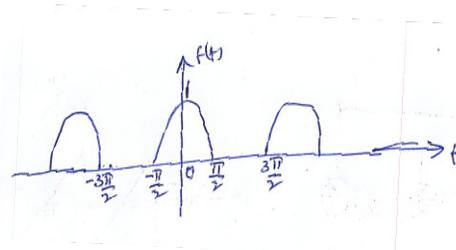


- 7 a) Obtain the expression for Fourier series in Trigonometric form. [6M]
- b) The current source is (t) is applied to the circuit is shown in below figures. Find first four harmonics. [9M]



Or

- 8 Find the Fourier series for a half wave rectifier sine wave shown in below figure. [15M]



- 9 a) Explain about the Fourier integrals and Fourier transforms. [9M]
- b) What are the specific differences between Fourier and Laplace transforms. [6M]

Or

- 10 Find the Fourier transform of the function shown in below figure. [15M]

