Code No: RT21021 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is the significance of phase sequence. (3M)
   b) How load power factor effects the wattmeter readings. (4M)
   c) Why can not the current in a pure inductor change in zero time. (4M)
   d) Define the hybrid parameters. (4M)
   e) What is the causality for network realized? (4M)
   f) Obtain the Fourier transform of constant signal. (3M)

PART –B

2. a) Explain the reactive power measurement by single watt meter method in a balanced three phase system (8M)
   b) A load impedance of $(4 + j3)$ ohm each is connected in a star and a supply voltage of 415 V, 50 Hz is applied to the load. Find (i) line current, (ii) power factor, (iii) power, (iv) reactive volt amperes, and (v) apparent power. (8M)

3. a) If $Z1 = 20 \angle -30°$, $Z2 = 40 \angle 80°$, and $Z3 = 10 \angle 90°$ are the impedances connected in the form of delta and the supply voltage is 440 V, assume the *RYB* sequence and find the phase currents, line currents, and the total power absorbed. (8M)
   b) The power input to a 250 hp, 1100-V, 3-phase motor running at full load is measured by two wattmeters which indicate 145 kW and 62 kW, respectively. Calculate (i) input, (ii) power factor, (iii) line currents. (8M)

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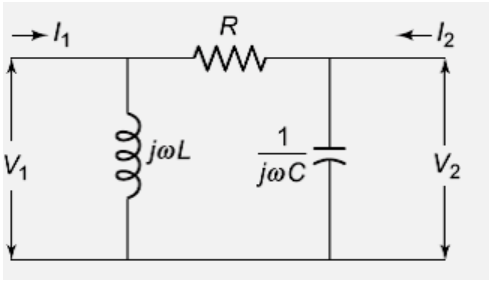
4. a) Explain briefly about initial conditions. (7M)

   b) A series RL circuit with parameters R= 5 ohms and L = 10H is supplied by a source of 20V. Obtain the expression for current using differential equation approach. (9M)

5. a) Determine the transmission parameter of the network shown in below Figure (8M)



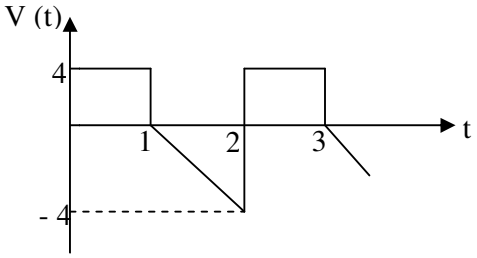
   b) A two-port network has the following parameters: (8M)
   Z_{22} = 40 ohm, Z_{11} = 30 ohm, and Y_{12} = 0.05 mhos, calculate the *ABCD* parameters of the network.

6. a) Explain the procedure of testing the given polynomial for positive realness and Test whether the polynomial P(s) = s^4+3 s^3+4s^2+5s+9 is positive real or not. (7M)

   b) Synthesis the impedance function Z(s)=$\frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$ using second form of Cauer network (9M)

7. a) Find the Fourier transform of the signum function and plot its amplitude and phase spectrum. (7M)

   b) Calculate the effective and average value for the wave form as shown in below figure. (9M)



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Code No: RT21021 **R13** SET - 2

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Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
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PART –A

1. a) Derive the relation between line and phase voltages for balanced star connected systems (4M)
   b) Define the unbalanced star connection and write its properties. (4M)
   c) What are the initial conditions? Why are they necessary? (4M)
   d) Define the transmission parameters (3M)
   e) Give the properties of LC immittance function. (4M)
   f) What is meant by wave symmetry? List out various types of symmetry. (3M)

PART –B

2. a) Distinguish between ABC phase and ACB phase sequence. (6M)
   b) A balanced delta-connected load of 5 $\angle 30°$ ohm and a balanced star-connected load of 5 $\angle 45°$ ohm are supplied by the same balanced 240 V, three-phase *ABC* system. Obtain line currents I_A, I_B and I_C. (10M)

3. a) Explain the two wattmeter methods for measurement of three phase power. (7M)
   b) An impedance of 80 ohm in *RY* phase, a reactance of 100 ohm and negligible resistance in *YB* phase, a capacitive reactance of 160 ohm in the phase *BR* is connected in the form of delta to a 3 phase supply of 400 V. Assume the phase sequence to be *RYB*. Calculate phase currents as well as line currents. (9M)
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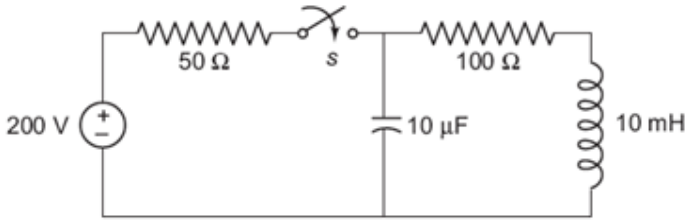
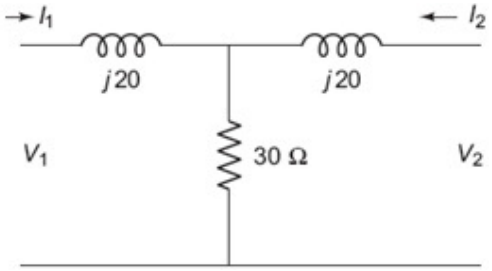
4. a) A series *R–L* circuit with *R* = 60 ohms and *L* = 30 H has a constant voltage V = 120 V applied *t* = 0. Determine the current *I*, the voltage across resistor, and the voltage across the inductor. (8M)

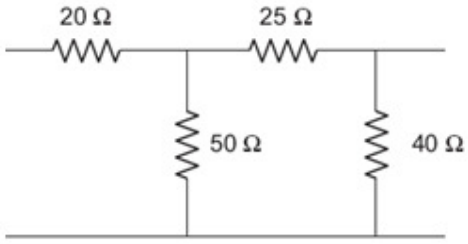
   b) When the switch is closed at *t* = 0, find the transient currents across inductor for the network shown in below Figure. Assume that initial current across the inductor is zero. (8M)



5. a) Find the *Z*-parameters of the network shown in below Figure (8M)



   b) Find the transmission line parameters of the network shown in below Figure (8M)



6. a) State the properties of R C impedance and admittance functions. (8M)

   b) Obtain the Foster –I form of LC network for the impedance (8M)

$$F(s)=\frac{s(s^2+3)}{(s^2+1)(s^2+2)}$$

7. a) Find the Fourier transform of a gate function and draw its magnitude and phase spectrum. (8M)

   b) Determine the resistance, impedance, average power and power factor of a circuit whose expression for voltage and current are given by (8M)

$$V(t)=20\sin(\omega t+45^0)-50\sin(3\omega t-35^0)\ volts$$

$$i(t)=5\sin(\omega t+45^0)+20\cos(3\omega t+60^0)\ amps$$

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2. Answer **ALL** the question in **Part-A**
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PART –A

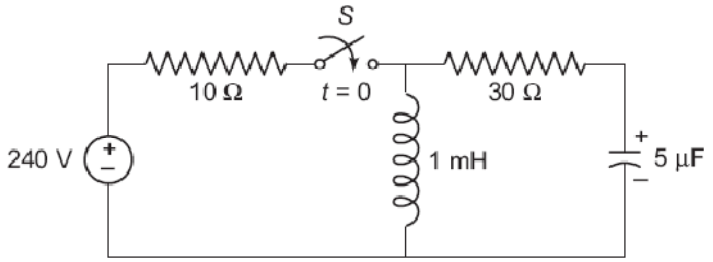
1. a) Derive the relation between line and phase voltages for balanced delta connected systems (4M)
   b) Define the unbalanced delta connection and draw its diagram (3M)
   c) Distinguish between classical and Laplace transform method of solution of a network. (4M)
   d) Define the Y-parameters and give the conditions for symmetry and reciprocity. (4M)
   e) What is meant by positive real function? (3M)
   f) Give the properties of Fourier transform. (4M)

PART -B

2. a) Explain the advantages of polyphase system over single phase system (6M)
   b) Each phase of a balanced star-connected load consists of R = 10 ohm and C = 10 μF.Calculate the line currents and total real and reactive powers when a symmetrical 415 V, 50 Hz, three-phase supply is applied to it. (10M)

3. a) How do you draw the power factor curve using two wattmeter method (6M)
   b) In a three-phase, 4-wire system if (5 + j7) ohm, (5 + j7) ohm and (8 + j10) ohm, are the loads connected and the supply voltage is 440 V. Find line and phase currents and the current passing through neutral wire. (10M)

4. For the circuit shown below figure, at t = 0, switch 'S' is closed. Find the transient current across the capacitor. Assuming the initial voltage drop across the capacitor to be zero. (16M)



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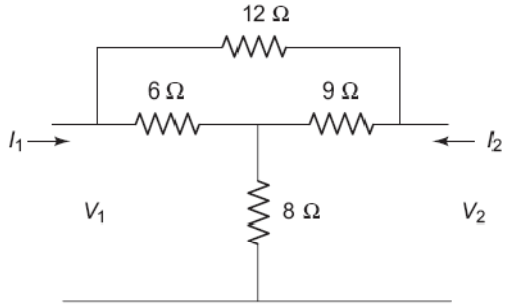
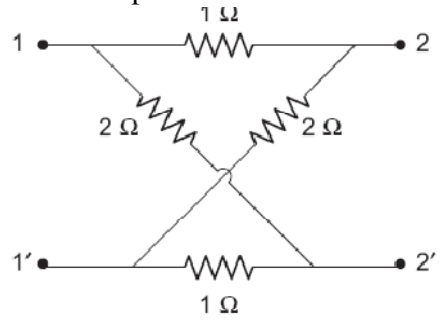
5. a) Find the *Z*-parameters of the network shown in below Figure (8M)



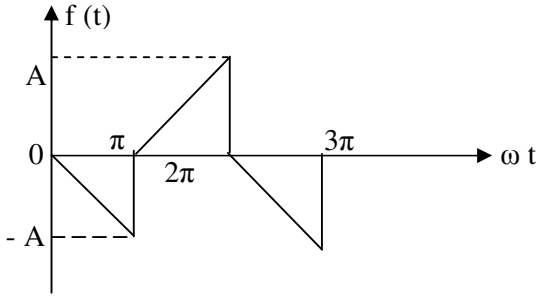
b) Find the *h*-parameters of the network shown in below Figure (8M)



6. a) Determine the range of 'a' so that P (s) = s^4+3 s^3+as^2+5s+9 is positive real. (7M)

b) Synthesize the first and second Cauer forms of network for the impedance (9M)
$Z(s)=\frac{2(s+1)(s+5)}{(s+2)(s+4)}$.

7. a) Determine the trigonometric form of Fourier series for the following wave form. (8M)



b) Derive the expression for average power of complex wave which is expressed in terms of Fourier series. (8M)

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2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

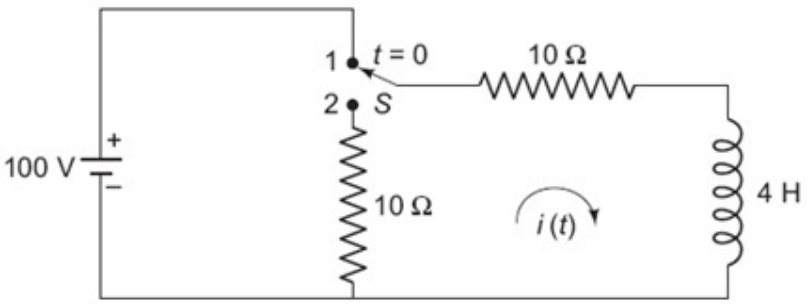
1. a) What do you understand by phase sequence. (3M)
   b) How do you convert to unbalanced star to unbalanced delta system (4M)
   c) Why the voltage drop across the capacitor does not change instantaneously (4M)
   d) Define the Z-parameters and give the conditions of reciprocity and symmetry. (4M)
   e) What is meant by positive real function. (3M)
   f) What are the Dirchlet conditions? (4M)

PART -B

2. a) Derive the relation between line and phase quantities for delta as well as star connected balanced systems. (8M)
   b) Determine the circuit parameters of the load per phase in the balanced star-connected load of 5 KW which takes a leading current of 12 A with a line voltage of 415 V, 50 Hz. (8M)

3. a) Explain the effect of power factor on wattmeter readings. (5M)
   b) A 3 phase, 4-wire, 415 V, AC system supplies a star-connected load in which $ZA = 10\angle 0°$, $ZB = 15\angle 30°$ and $ZC = 10\angle -30°$ ohm. The phase sequence is *ABC*. Find currents and power absorbed. (11M)

4. For the network shown in below figure, the switch is moved from position 1 to position 2. Under steady state condition, find the value of current i(t). (16M)



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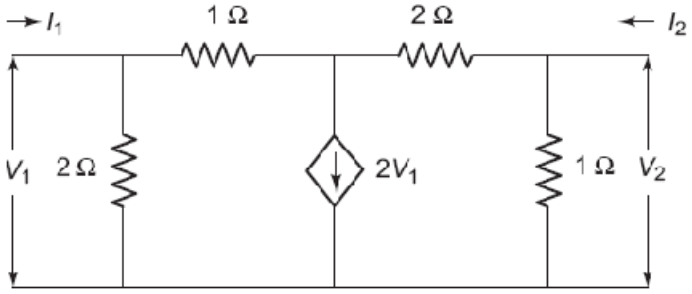
5. Find the *Z*-parameters of the network shown in below Figure (16M)



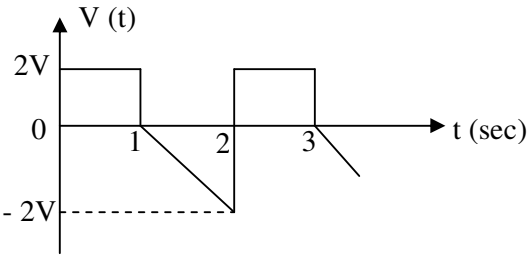
6. a) Test whether the following function is a positive real function (4M)

$$F(s)=\frac{s^4+3s^3+5s^2+7s+4}{2s^2+4s^3+9s^2+10s+5}$$

b) An impedance function is given by Z(s) = $\frac{(s+1)(s+3)}{s(s+4)(s+5)}$ Find the R-C representation of Foster- I and II forms (12M)

7. a) What are the different wave symmetry? Describe the even function symmetry with examples. (8M)

b) Determine the RMS and average value of the voltage shown in below figure (8M)



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