Code No: R2021023 **R20** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, December-2023
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

1 a) Derive and analyze the voltage and current relations in a star connected load with phasor diagrams. [7M]

b) A balanced 3-phase star connected load of 147kW takes a leading current of 97A with a line voltage of 1212V, 50Hz. Determine the circuit constants of the load per phase. [7M]

OR

2 a) Elaborate the loop method for analyzing the three phase un balanced circuits with diagrams. [7M]

b) Each phase of a 3-phase delta connected load has 0.5H inductor in series with a parallel combination of a 9.2 micro farads capacitor and 102 ohms resistor. If a three phase voltage of 220V at a frequency of 410 rad/sec is applied to this load, calculate the phase current, line current and total power absorbed by the load? [7M]

UNIT-II

3 a) Analyze the transient response of DC source driven R-L circuit and derive the value of arbitrary constant. [7M]

b) Obtain the expression for the current in a series R-L-C circuit fed by a D.C voltage of 24V with R=3.6 ohms, L=1.5H and C=0.28F. Assume the zero initial conditions. [7M]

OR

4 a) Derive and analyze the transient response of second order R-L-C circuit excited by D.C source by using differential equations approach. [7M]

b) A series R-C circuit consists of R=16 ohms and C= 0.4F as shown in the following figure 4b. A constant voltage of 16V is applied at t=0. Obtain the current equation and also find the voltage across R and C? [7M]

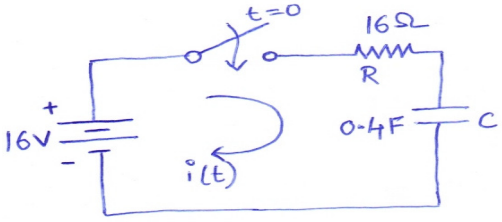

Fig.4b

UNIT-III

5 a) Derive the complete solution of current from transient response of series R-L circuit for A.C excitation by using differential equations. [7M]

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b) In the circuit shown in figure 5b, obtain the expression for the current if the switch is closed at t=0 and the value of current at t=1.4 milli seconds. Assume initial charge on the capacitor as zero? [7M]

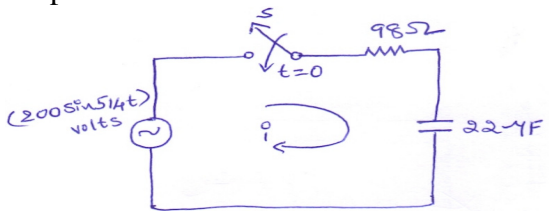

Fig.5b

OR

6 a) Draw the circuit diagram and analyze the transient response of R-L-C series circuit with sinusoidal excitation using Laplace transforms. [7M]

b) In the R-L circuit shown in the following figure 6b, the switch is closed at t=0. Calculate the resulting current by assuming zero initial conditions. [7M]

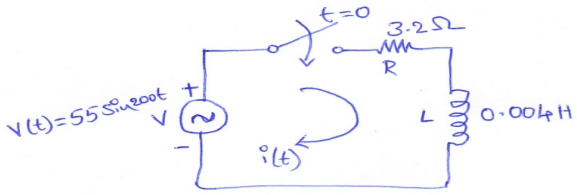

Fig.6b

UNIT-IV

7 a) Derive and analyze the equivalent circuit of a two port network in terms of open circuit impedance parameters. [7M]

b) The current I_1 and I_2 entering at port 1 and port 2 respectively of a two port network are given by the equations: [7M]
$I_1=0.6V_1-0.3V_2$; $I_2=-0.4V_1+V_2$. Calculate the impedance and A, B, C, D parameters of the network?

OR

8 a) Describe the analogy between transmission line and a two port network with relevant expressions. [7M]

b) Determine the h-parameters for the circuit shown in the following figure 8b. [7M]

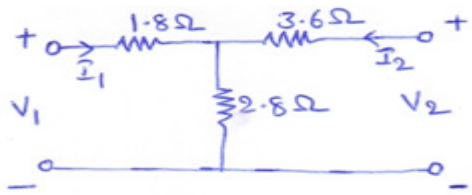

Fig.8b

UNIT-V

9 a) Draw and explain in detail about the basic filter networks. [7M]

b) Design a high pass filter, T and π section to work into impedance 515 ohms and have cut off frequency of 1.2kHz. For this filter find the phase angle 'β' at frequency of 1.7kHz and attenuation 'α' in neper at frequency of 0.8kHz? [7M]

OR

10 a) Explain in detail about the characteristic impedance and frequency characteristics of low pass filter with relevant expressions. [7M]

b) Design a prototype band pass filter for 'T' and 'π' sections if design impedance R_0=5.1 kΩ and pass band between 1.22kHz and 2.2 kHz. [7M]

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UNIT-I

1 a) Derive and analyze the voltage and current relations in a delta connected load with phasor diagrams. [7M]

b) Three identical resistances are connected in star against a balanced three phase voltage supply. If one of the resistances is removed, estimate the reduction in the power by drawing circuit diagrams? [7M]

OR

2 a) Explain the procedure and applications of star-delta transformation of three phase unbalanced circuits. [7M]

b) Each phase of a balanced star connected load consists of R = 13.8 ohms and C=11 micro farads. Find the line current and total real and reactive powers when a symmetrical 415V, 50Hz, 3-phase supply is connected. If two watt meters are employed for measuring total power, what will be the reading of the two watt meters? [7M]

UNIT-II

3 a) Obtain the time current characteristics in the transient response of series R-L-C circuit excited by D.C source with relevant equations. [7M]

b) In the circuit shown in following figure 3b, initially the switch is kept open for long time. At t=0 the switch K is closed. Obtain the expression for current in the circuit for t>0. Calculate the value of current at t=0.32 seconds? What will be the current in the circuit in one time constant period? Calculate the instant of time at which the current in the circuit reaches to 1.7A. [7M]

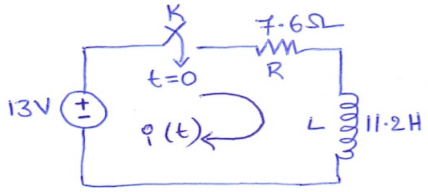

Fig.3b

OR

4 a) Derive and analyze the transient response of second order R-L-C circuit excited by D.C source by using Laplace transform approach. [7M]

b) For the circuit shown in the figure 4b, calculate the voltage $V_C(t)$ at 210 micro seconds? Also obtain the expression for the current through capacitor $i_C(t)$. [7M]

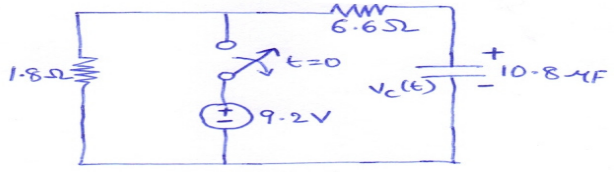

Fig.4b

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UNIT-III

5 a) Derive the complete solution of current from transient response of series R-C circuit with sinusoidal excitation by using differential equations. [7M]

b) For the network shown in the figure 5b, steady state is reached with the switch open. At t=0, the switch is closed. Find the current *i(t)* for t≥0. [7M]

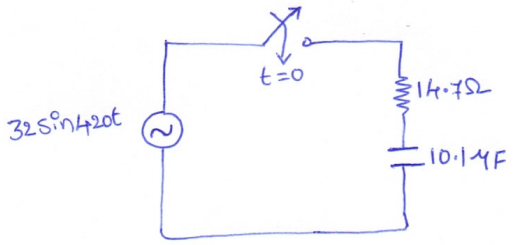

Fig.5b

OR

6 a) Draw the circuit diagram and analyze the transient response of R-L-C series circuit with time varying excitation using differential equations. [7M]

b) In the circuit shown in figure 6b, find the complete solution for the current when the switch is closed at t=0 with the applied voltage. [7M]

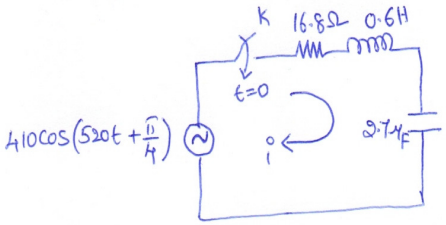

Fig.6b

UNIT-IV

7 a) Derive and analyze the equivalent circuit of a two port network in terms of short circuit admittance parameters. [7M]

b) The Z-parameters of a two port network are Z_{11}= 6.7 ohms, Z_{22} = 4.6 ohms, Z_{12}= Z_{21}= 3.4 ohms. Find the y-parameters and A, B, C, D parameters and write the describing equations. [7M]

OR

8 a) Derive and analyze the condition for symmetry of 'h' parameters of a two port network. [7M]

b) From the basic transformer equations, obtain the A, B, C, D parameter matrix of the transformer shown in the figure 8b? [7M]

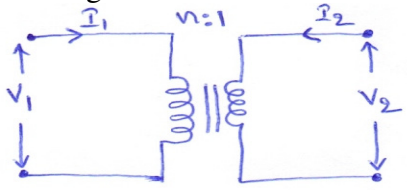

Fig.8b

UNIT-V

9	a)	Explain in detail about the ideal characteristics of a filter circuit.	[7M]
	b)	Design a constant-K, 'T' section and π section high pass filter having cut off frequency of 12kHz and characteristic impedance of 616 ohms.	[7M]

OR

10	a)	Derive the reactance curves and obtain the cut off frequency expression of high pass filter?	[7M]
	b)	Design a prototype band pass filter to work into 512 ohms load with cut off frequency of 1.3kHz and 5.8 kHz? Also Calculate the element value of L and C for a prototype band pass filter terminated with 512 ohms and cut off frequency of 1.3kHz and 5.8 kHz?	[7M]

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UNIT-I

1 a) Draw the connection diagram and explain the three phase power measurement of star connected load. [7M]

b) A star connected load with three equal impedances takes 11kW at 0.7 power factor leading when connected to 400V 3 phase three wire supply. Calculate the line current if one phase of the load is short circuited. Also find the line current if one of the impedances is disconnected. [7M]

OR

2 a) Explain the procedure and applications of delta-star transformation of three phase unbalanced circuits. [7M]

b) Two watt meters in a 3 phase three wire system with an effective line voltage of 110V read 1400W and 438W. Find the impedance of each arm of the balanced delta connected load? Also find the power factor of the load. [7M]

UNIT-II

3 a) Derive and analyze the transient response of source free series R-C circuit with necessary equations. [7M]

b) In how many seconds after t=0 has the current *i(t)* become one half of its initial value in the given circuit shown in figure 3b? [7M]

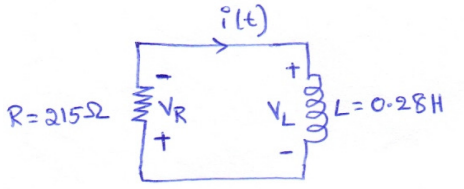

Fig.3b

OR

4 a) Draw the circuit diagram and describe transient response of R-L series circuit excited by D.C source by using differential equations. [7M]

b) For the circuit shown in figure 4b, the steady state conditions are reached for the switch K in position '1'. At t=0, the switch is changed to position '2'. Use time domain method to find the current through inductor for all t≥0. [7M]

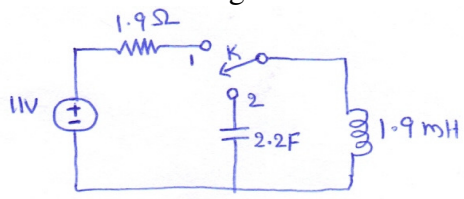

Fig.4b

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UNIT-III

5 a) Derive and analyze the transient response of R-C series circuit with sinusoidal excitation by using Laplace transforms. [7M]

b) Derive the expression for the current *i(t)* in the circuit shown in figure 5b by using Laplace transform. [7M]

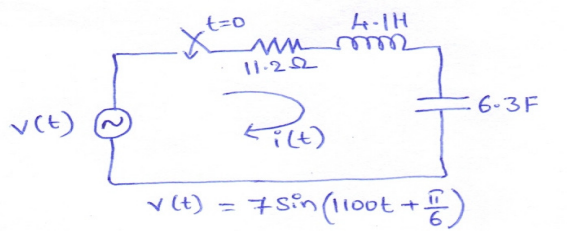

Fig.5b

OR

6 a) Derive and analyze the second order series circuit with A.C excitation during transient condition by using differential equations. [7M]

b) In the circuit shown in figure 6b, the applied voltage is v(t)=15sin(12t+π/6), R=1.7 ohms, C=1.5F. Using Laplace transformation, determine the complete solution for the current i(t). Switch K is closed at time t=0. Assume zero charge across the capacitor before switching? [7M]

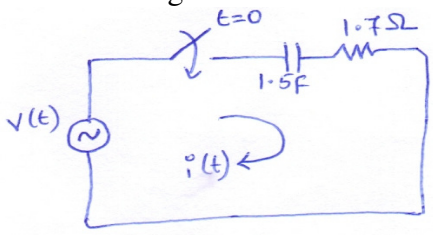

Fig.6b

UNIT-IV

7 a) Derive and analyze the equivalent circuit of a two port network in terms of hybrid parameters. [7M]

b) For a two port network, y-parameters are y_{11}=0.2 mho, y_{22} = 0.04 mho, y_{12}= y_{21}= -0.05 mho. Find the impedance parameter matrix. [7M]

OR

8 a) Derive and analyze the condition for symmetry of transmission parameters of a two port network. [7M]

b) Determine the h-parameters for the circuit shown in Figure 8b. [7M]

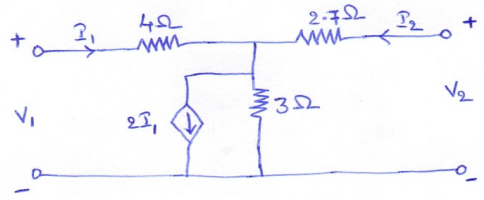

Fig.8b

UNIT-V

9 a) Explain in detail about the practical characteristics of a filter circuit. [7M]

b) Calculate the component values of π and T section constant $-K$ high pass filter having a cut off frequency of 8.2kHz and nominal characteristic impedance of 492 ohms. Calculate the characteristic impedance of phase constant at f=14kHz and attenuation at f=1.2kHz. [7M]

OR

10 a) Analyze the variation of attenuation constant with frequency of low pass filter by drawing the characteristics and by using relevant expressions. [7M]

b) Design a prototype band elimination filter sections if design impedance is 387 ohms and cur off frequencies are 1175 Hz and 2100Hz. [7M]

Code No: R2021023 **R20** SET - 4

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All Questions carry **Equal** Marks
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UNIT-I

1 a) Draw the connection diagram and explain the three phase power measurement of delta connected load? [7M]

b) A balanced 3-phase star connected load of 122kW takes a leading current of 88A when connected across 3-phase, 1400V, 50 Hz supply. Calculate the value of the resistance per phase and capacitance per phase of the load and power factor of the load? Calculate the total kVA and kVAr of the circuit? [7M]

OR

2 a) Draw the circuit diagram and explain the process and advantages of two watt meter method for 3 phase power measurement? [7M]

b) A 3 phase 200V, 50Hz, 12.8kW induction motor has a full load efficiency of 82% and draws a line current of 36A under full load, when connected to three phase, 200V supply. Determine the reading on two watt meters connected in the circuit to measure the input to the motor? Also find the power factor at which the motor is operating? [7M]

UNIT-II

3 a) Derive and analyze the transient response of un driven series R-L circuit with necessary equations? [7M]

b) Find the time constant of a source free R-L series circuit in which the power output is 110W at specific instant of time and changes by 33W after 1.4 seconds? [7M]

OR

4 a) Draw the circuit diagram and describe transient response of source free R-C series circuit by using differential equations? [7M]

b) The network shown in figure 4b is under steady state condition with switch K is at position 1. Obtain the expression for *i(t)* if switch K is moved to position 2? [7M]

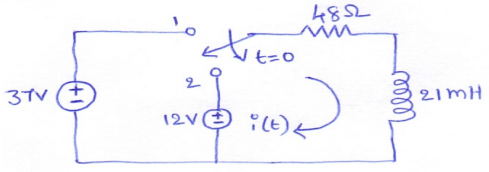

Fig.4b

UNIT-III

5 a) Derive and analyze the transient response of R-L series circuit with sinusoidal excitation by using Laplace transforms? [7M]

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b) In the R-L series circuit with R=45 ohms and L=0.3H has a sinusoidal voltage source $v(t)=155sin(514t+\Phi)$ volts applied at time when $\Phi=0^0$. Obtain the expression for the total current? [7M]

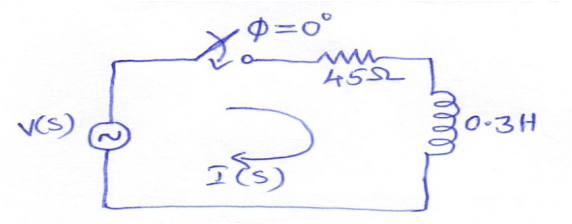

Fig.5b

OR

6 a) Derive and analyze the second order series circuit with A.C excitation during transient condition by using Laplace transforms? [7M]

b) For the circuit shown in figure 6b, find the particular solution for *i(t)* through the circuit by assuming zero initial conditions? [7M]

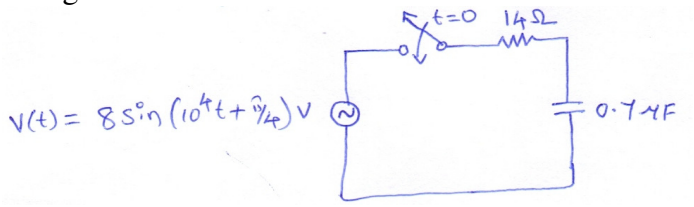

Fig.6b

UNIT-IV

7 a) Derive the transmission parameters of a two port network and analyze with relevant expressions? [7M]

b) The Z-parameters of network are Z_{11}=2.4 ohms, Z_{12}=1.4 ohms, Z_{21}=1.4 ohms and Z_{22}=5 ohms. Calculate the y and A, B, C, D parameters? [7M]

OR

8 a) State and prove the condition for reciprocity of admittance parameters of a 2 port network? [7M]

b) The test results for a two port network are as follows: [7M]

a) With port-2 open circuited $I_1=0.2\angle 0^0$A, $V_1=3.2\angle 40^0$V, $V_2=7.2\angle -22^0$V.

b) With port-1 open circuited $I_2=0.2\angle 0^0$A, $V_1=5.1\angle -82^0$V, $V_2=5.2\angle 62^0$V. Calculate the Z-parameters?

UNIT-V

9 a) Compare and explain the ideal and practical characteristics of a filter circuit? [7M]

b) A prototype high pass filter has cut-off frequency of 15kHz and design impedance of 582 ohms. Determine element values of L and C? Also calculate the attenuation in dB and phase shift in degrees at a frequency of 9 kHz? [7M]

OR

10 a) Derive and explain the reactance-frequency characteristics of low pass filter with necessary relations? [7M]

b) Design a prototype band pass filter T-section having cut off frequencies of 2300Hz and 400Hz and nominal characteristic impedance of 626 ohms? [7M]

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