Date of Examination : 19/09/2018

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department : Electrical and Electronic Engineering

Program : Bachelor of Science in Computer Science and Engineering

Semester Final Examination, Spring 2018

Year: 1st **Semester: 2nd**

Course number: EEE 1241

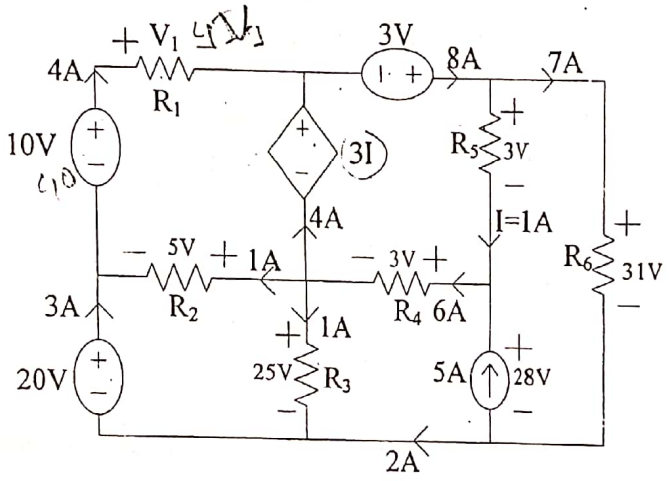
Course Name: Basic Electrical Engineering

Time: 3 (Three) hours **Full Marks: 210**

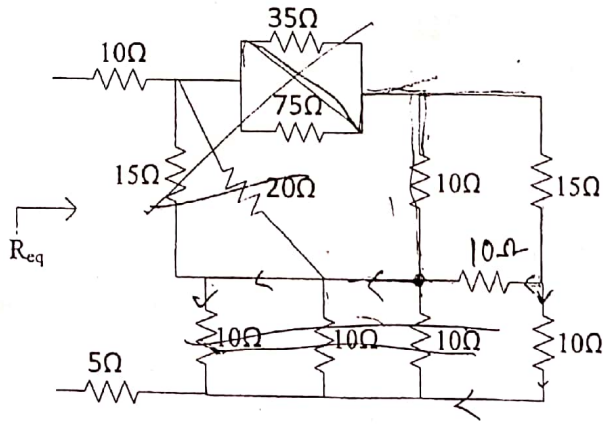
There are eight (8) questions. Answer any six (6)

Marks allotted for each question are indicated in the right margin

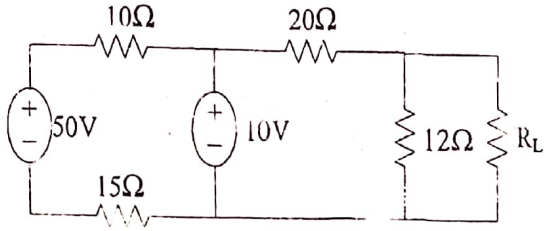
01. (a) Using the concepts of power, find V_1 of the following circuit. **17**



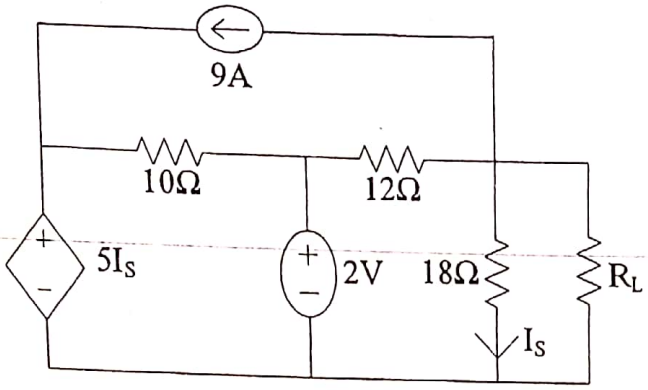
(b) Determine the equivalent resistance for the following network. **18**



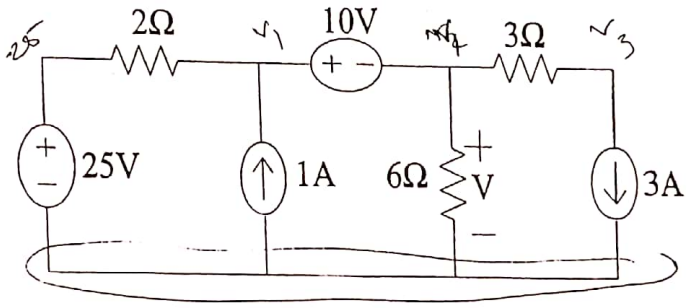
02. (a) State Thevenin's theorem. Find the Thevenin's equivalent circuit with respect to the load resistance R_L for the following circuit. **15**



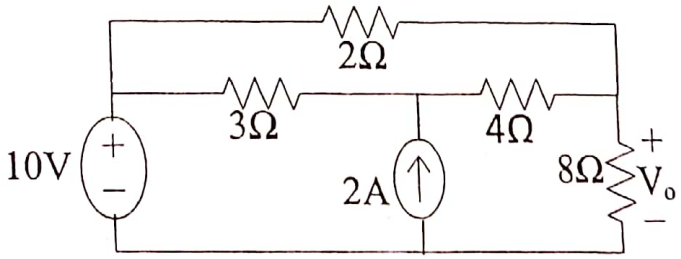
(b) Which methods are used to obtain Thevenin's equivalent resistance, if the original circuit contains dependent source? Determine Thevenin's equivalent resistance using one of these methods for the following circuit. 20



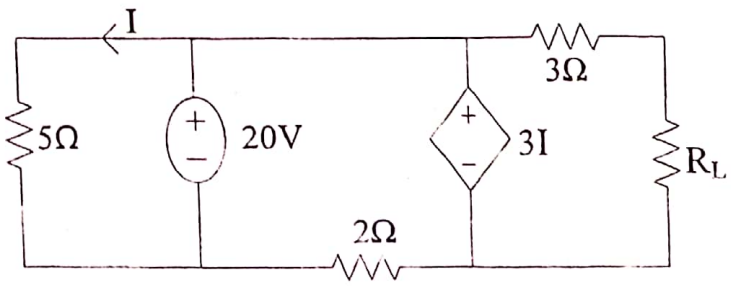
03. (a) Perform nodal analysis to determine the value of voltage V of the following circuit. 17



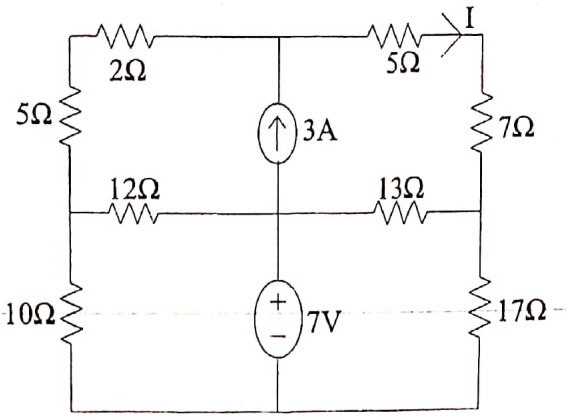
(b) State superposition theorem. Find the value of voltage V_o using superposition theorem for following circuit 18



04. (a) State Norton's theorem. Find the Norton's equivalent circuit with respect to the load resistance R_L for the following circuit. 18



(b) With the help of mesh analysis, determine the value of current I for the following circuit. 17



05 (a) State and prove maximum power transfer theorem. 15

(b) For the following circuit, determine: 20

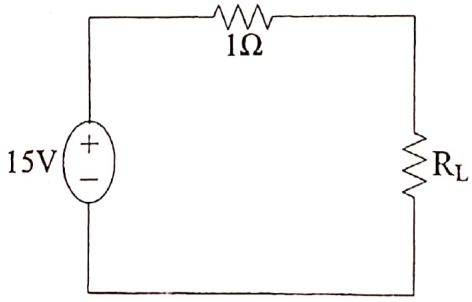
i. R_L for maximum power transfer

ii. Current level and power delivered to the load under maximum power transfer condition

iii. Efficiency of the system

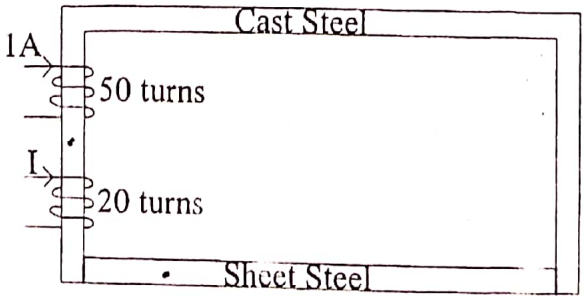
iv. Efficiency and transferred power if a load of 120Ω is connected

v. R_L for obtaining efficiency of 80%



06. (a) What is fringing effect? Explain hysteresis in ferromagnetic material with necessary diagram. 15

(b) Find the current I required to establish a flux of 2×10^{-4} Wb in the following magnetic circuit. A set of B-H curves is attached at the end of the question. Mark the appropriate points on the B-H curves and attach the page with your answer script. 20

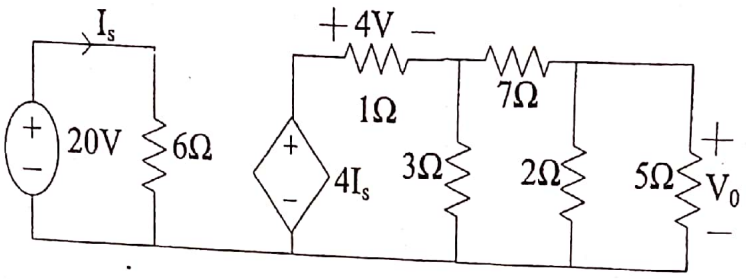


Area, A=1 inch² (throughout)

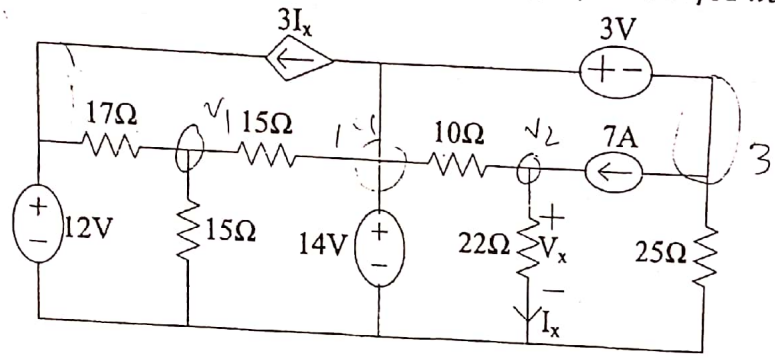
$l_{cast\ steel}$= 12 inch

$l_{sheet\ steel}$= 5 inch

07. (a) For the following circuit, determine the voltage V_0 using KVL and KCL. 17

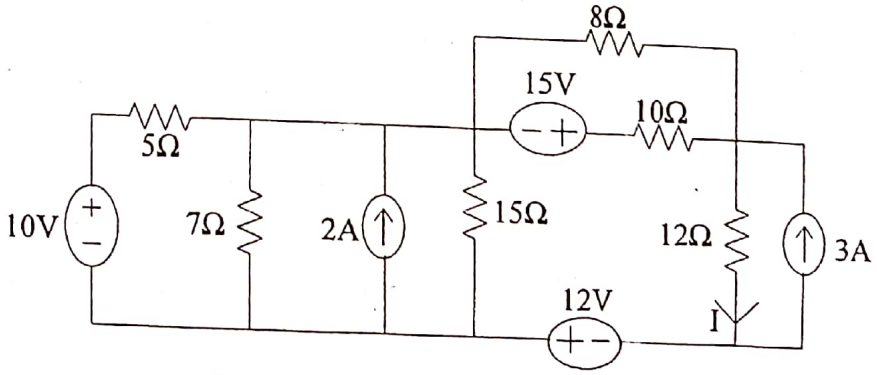


(b) Find the value of voltage V_x of the following circuit using any method you want. 18



08. (a) Explain current divider rule and voltage divider rule. Also show that if two resistors of same resistance are connected in series, voltage is divided equally across the two resistors. 15

(b) For the following circuit, determine the value of current I using source transformation technique. 20



C.S.E
1-2

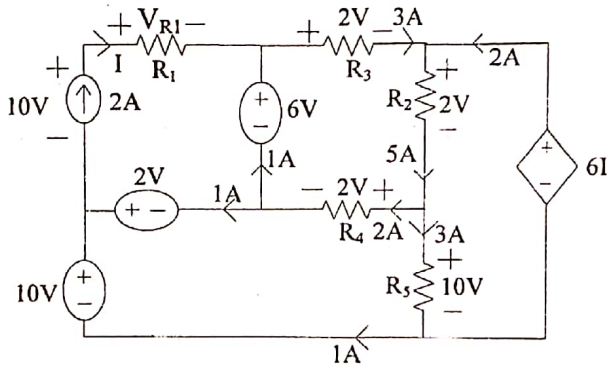
Date of Examination : 08/ 05/ 2019

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

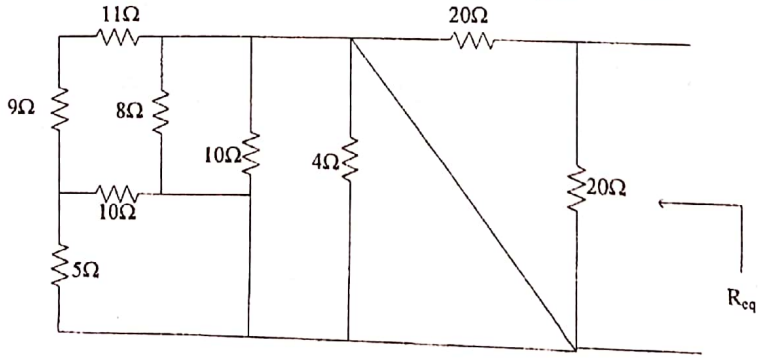
Department : Electrical and Electronic Engineering
Program : Bachelor of Science in Computer Science and Engineering
Semester Final Examination, Fall 2018
Year: 1st Semester: 2nd
Course number: EEE 1241
Course Name: Basic Electrical Engineering
Time: 3 (Three) hours Full Marks: 210

There are eight (8) questions. Answer any six (6)
Marks allotted for each question are indicated in the right margin

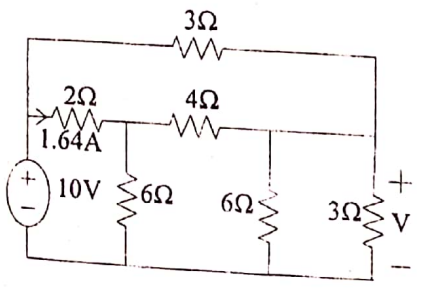
1. a. Using the concepts of power, find the voltage V_{R1} of the following circuit. 17



b. Determine the equivalent resistance for the following network. 18

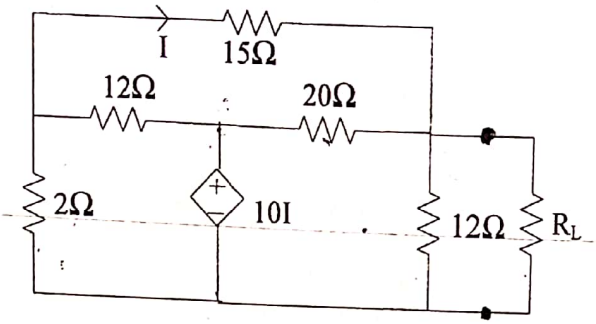


2. a. With the help of Kirchhoff's voltage law (KVL) and Kirchhoff's current law (KCL), determine the voltage V of the following circuit. 17

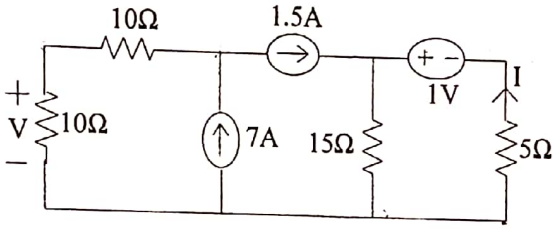


b. State Thevenin's theorem, Norton's theorem and superposition theorem. 18

3. a. Determine Thevenin's equivalent circuit with respect to the load resistance R_L for the following circuit. 18

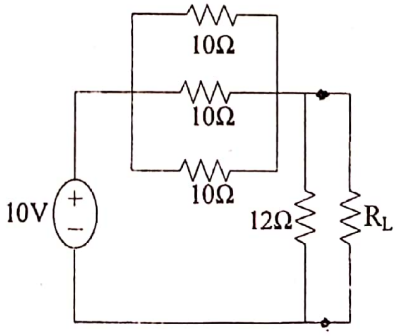


b. Perform nodal analysis to determine the voltage V and the current I of the following circuit. 17



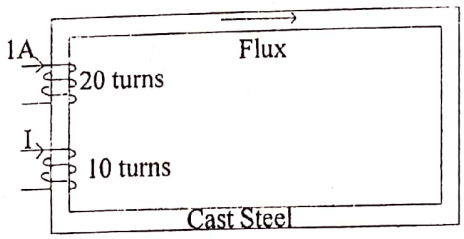
4. a. Show that efficiency of an electrical network is 50% during the transfer of maximum power. 15

b. For the following circuit, determine: 20
i. R_L for maximum power transfer
ii. Current level and power delivered to the load under maximum power transfer condition
iii. Efficiency and transferred power if a load of 10Ω is connected
iv. R_L for obtaining efficiency of 60%



5. a. Define magnetic flux density and magnetic field intensity. Show that B=μH. 15

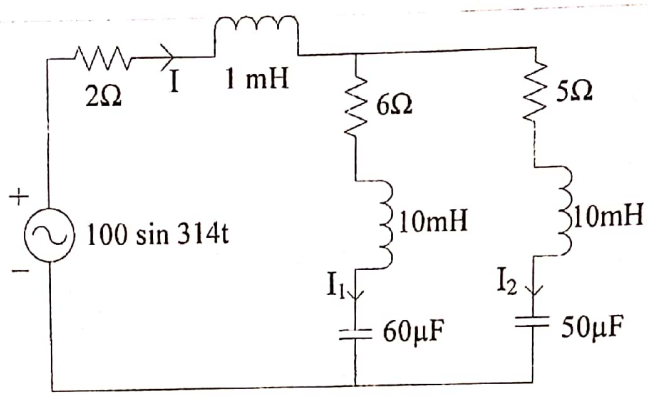
b. Find the current I required to establish a flux of 2×10^{-4} Wb in the following magnetic circuit. A set of B-H curves is attached at the end of the question. Mark the appropriate points on the B-H curves and attach the page with your answer script. 20



Area, A =10×10^{-4} m^2
Length= 12 inch

6. a. Show that for a sinusoidal wave, RMS value= 0.707×(Peak value). 15

b. For the following circuit, calculate I, I_1 and I_2. Also find the power factor of the network. 20



7. a. Determine the phase relationship between the waveforms of each of the following sets. 15

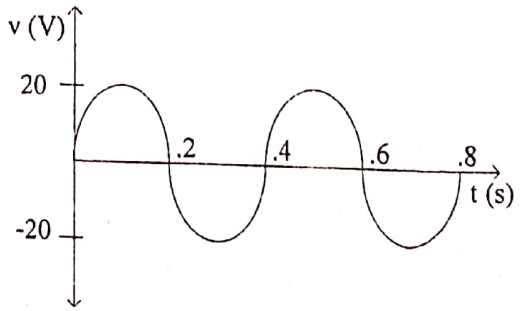
i. v(t) =10 sin (500t)
i(t) = 5 sin (500t+50°)

ii. v(t) =2 cos (500t+50°)
i(t) = 5 sin (500t)

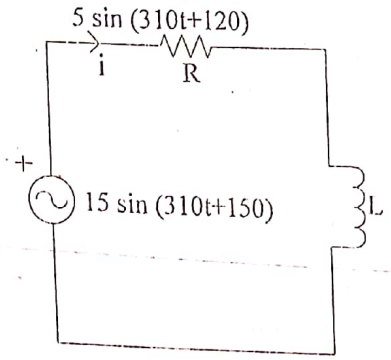
iii. v(t) =10 sin (500t+10°)
i(t) = 5 sin (500t-10°)

b. Show that for an inductor, voltage leads current by 90°. Find the expression for instantaneous power. 20

8. a. Find the amplitude, period, frequency of the following voltage signal and also represent the signal with an equation. 17



b. For the following circuit, determine the value of impedance, resistance, inductance and power factor of the circuit. 18



4/3/17

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, FALL-2016

COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

TIME: 3 HRS **FULL MARKS: 210**

SECTION-A

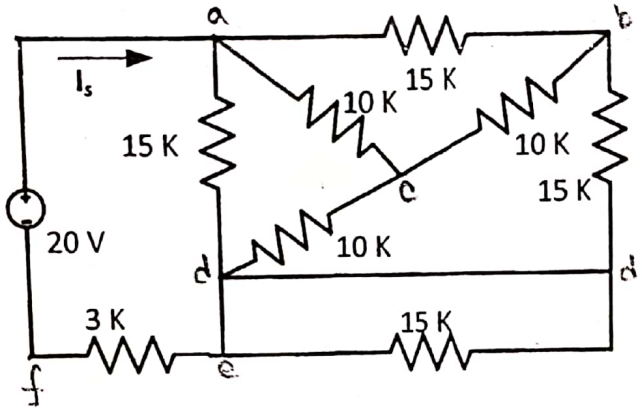
There are Four(4) questions. Answer any Three(3)

Marks allotted for each question are indicated in the right margin

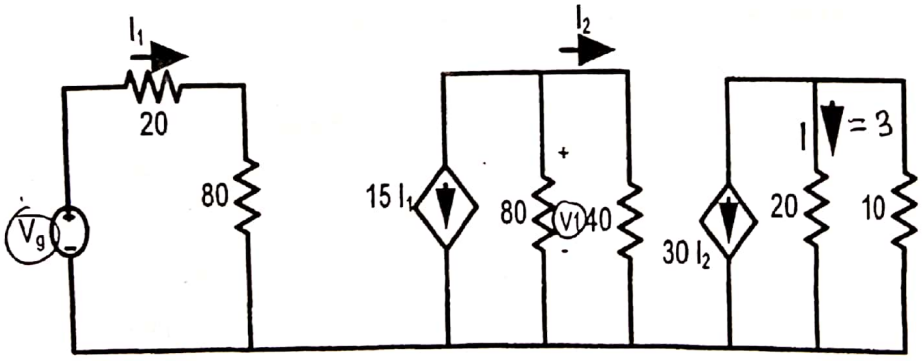
(All resistances are in ohms if not specified)

Use separate scripts for each section

01. (a) State Ohm's law and KCL. Determine the value of current I_s for the following circuit. **15**

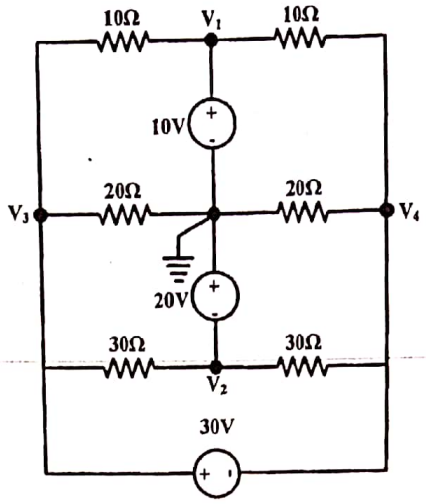


(b) Given current I= 3 A. Calculate the value of voltage Vg and V_1 for the following circuit. **20**



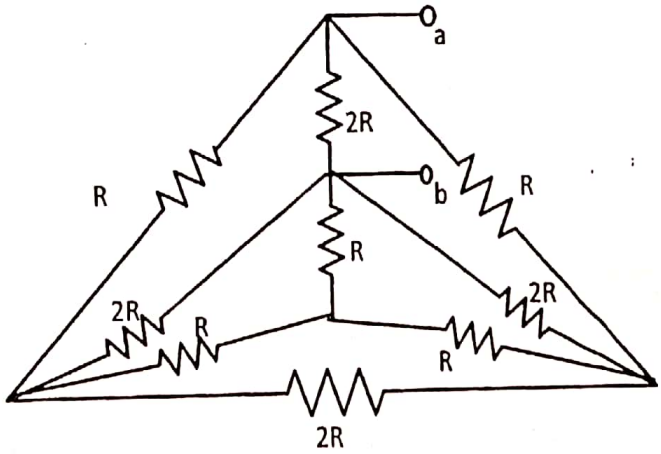
02. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also show that the efficiency for maximum power transfer is 50%. **17**

(b) Using 'Node Voltage Analysis', find V_1, V_2, V_3 and V_4 in the following circuit. **18**

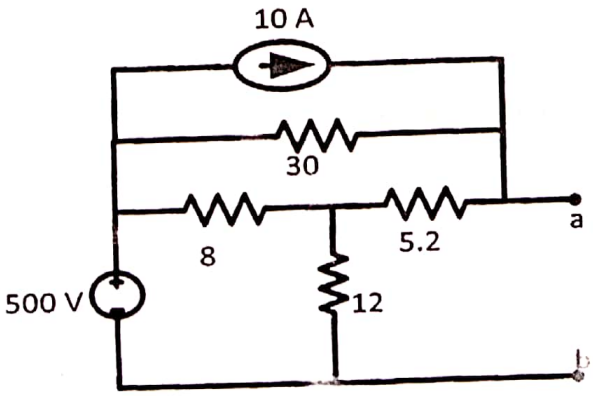


03.

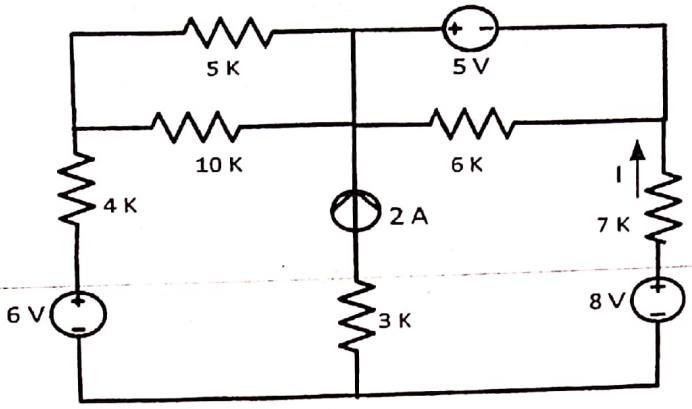
(a) Using Y-Δ and Δ-Y conversion, determine the equivalent resistance at terminals a-b for the following network. The value of resistance R is 10 KΩ. **17**



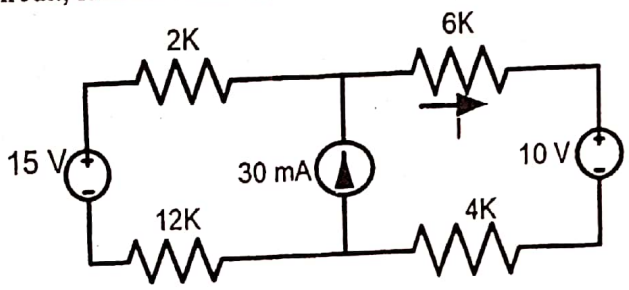
(b) For the following circuit, find the Norton's equivalent circuit with respect to the a-b terminals. **18**



04. (a) Using mesh current analysis, find out the value of current I for the following circuit. 18



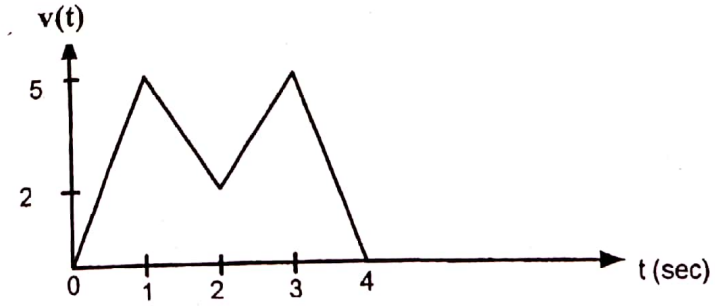
(b) For the following circuit, find the value of current "I" using superposition theorem. 17



SECTION-B

There are Four(4) questions. Answer any Three(3)

05. (a) The voltage across the capacitor of 2mF is represented by the following signal. Draw the current signal. 18



(b) Let, the current equation of a circuit be represented by i= -2 cos(ωt-60°) and the voltage equation by v =3 sin(ωt-150°). Draw the voltage and current wave shapes. What is the phase difference between voltage and current? Let us say, a 4A dc component is added to the current wave shape. Sketch the resultant wave shape. Also, write down the analytical expression for the resultant current wave shape if the frequency is 60Hz. 17

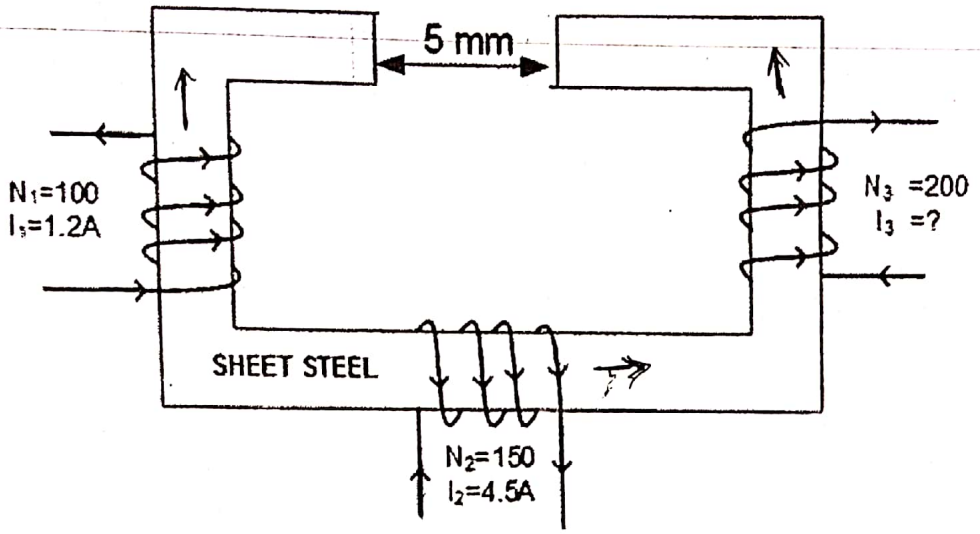
06.

(a) What do you mean by Fringing effect and residual flux? State right hand rule to determine the direction of the magnetic field around a current-carrying conductor. **15**

(b) Find the current I required to establish the flux, $4*10^{-4}$ wb in the following magnetic circuit. A set of B-H curve is attached at the end of the question. Mark the appropriate points on the B-H curve and attach the page with your answer script. **20**

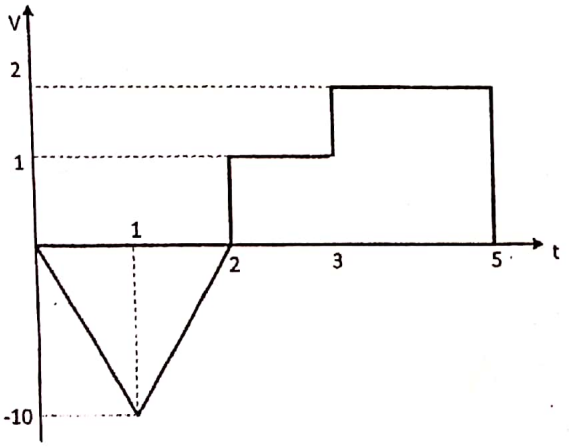
Area, A= 4 cm^2 (throughout)

$l_{cast\ steel}$= 200cm



07.

(a) Find the average and rms value of the following wave shape. **17**



(b) The voltage applied across an R-C series circuit is 230V (rms), 50Hz with a phase lag of 36.87°. The current through the circuit is 4A (rms). **18**

(i) Write the expressions for current and voltage equations.

(ii) Find the value of resistor and capacitor of the circuit.

(iii) Find the total real, reactive and apparent power.

(iv) What is the power factor of the circuit?

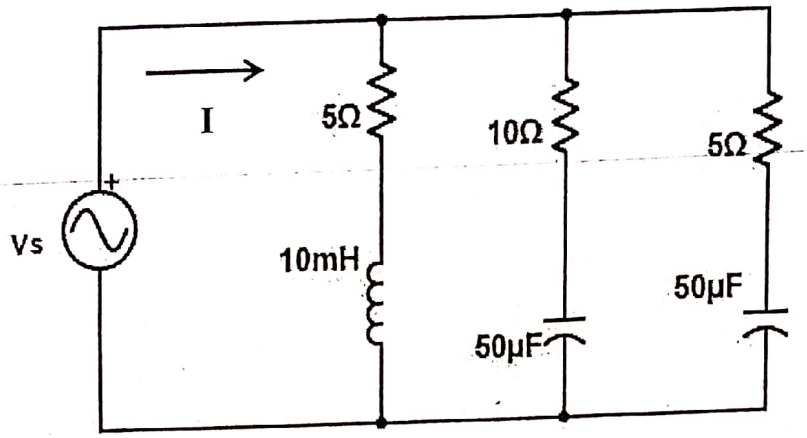
08.

(a) An alternating voltage $v(t)=V_m \sin \omega t$ is applied to an inductive circuit. Prove that energy received by the inductor during a quarter cycle is- 15

$W_L = ½ * LI_m^2$; I_m=peak value of current

20

(b)



Find the current I for the above circuit if Vs=100∠0° Volts (maximum), f=50Hz.

Date: 03.10.2016

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, SPRING-2016

COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

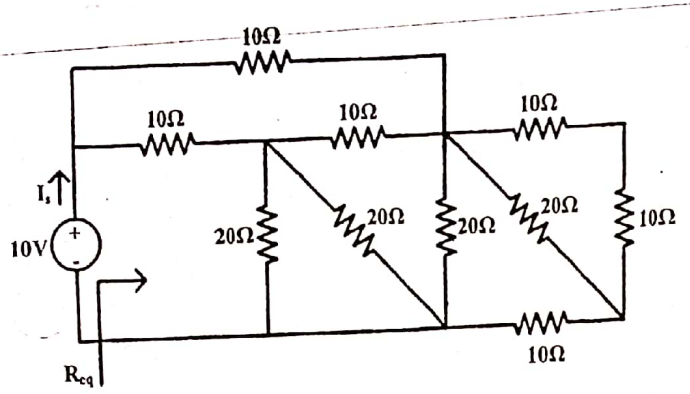
FULL MARKS: 210

TIME: 3 HRS

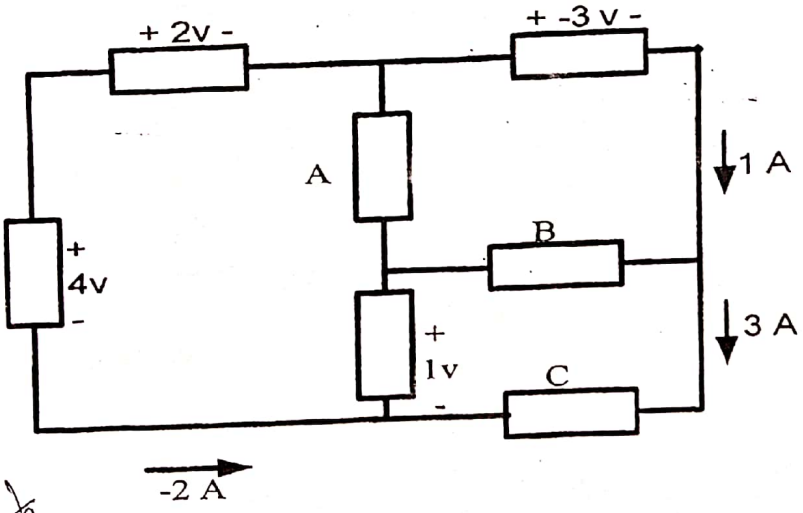
SECTION-A

There are Four (4) questions in this section. Answer any Three (3)

1. (a) Find the value of current I_s and equivalent resistance R_{eq} for the following circuit. **[15]**

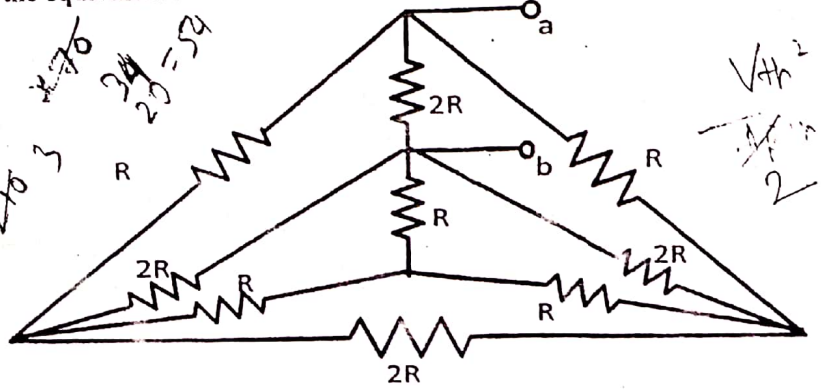


(b) State Ohm's law. For the following circuit find the value of Power to the element A, B and C. **[20]**



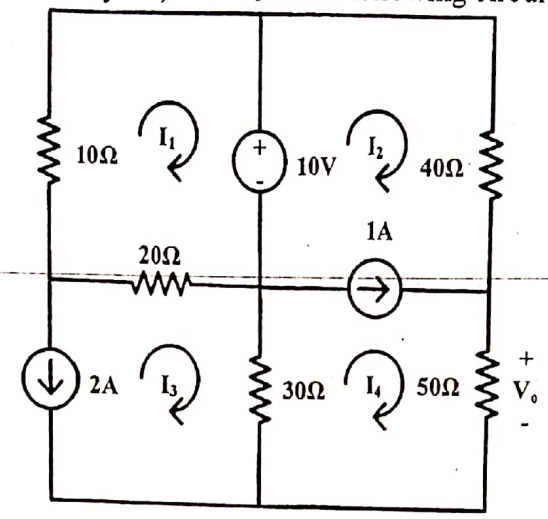
2. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also show that the efficiency for maximum power transfer is 50%. **[17]**

(b) Determine the equivalent resistance at terminals a-b for the following network. Here R= 9 Ω **[18]**

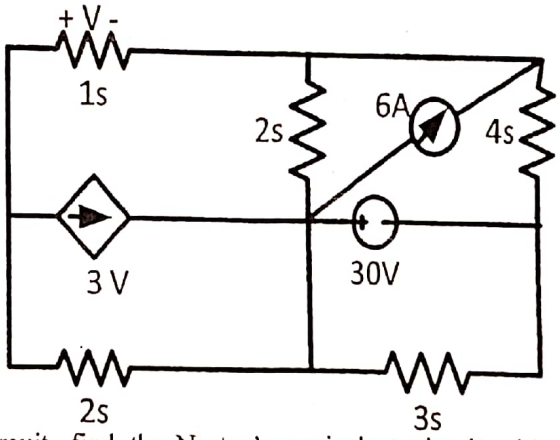


3. **(a)** Convert a Pie (delta) connected resistive network into its equivalent T(Y) network. **[18]**

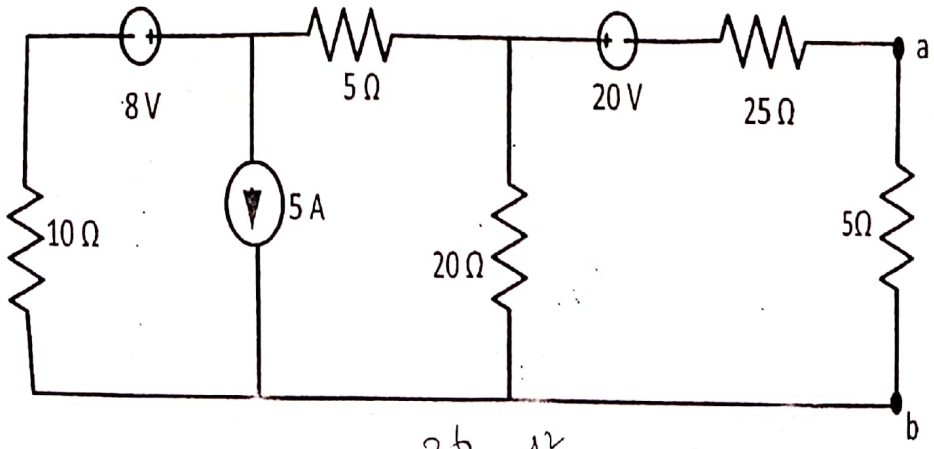
(b) Using 'Mesh Current Analysis', find V_o in the following circuit. **[17]**



4. (a) Using 'Node Voltage Analysis', find the value of voltage V for the following circuit. **[18]**



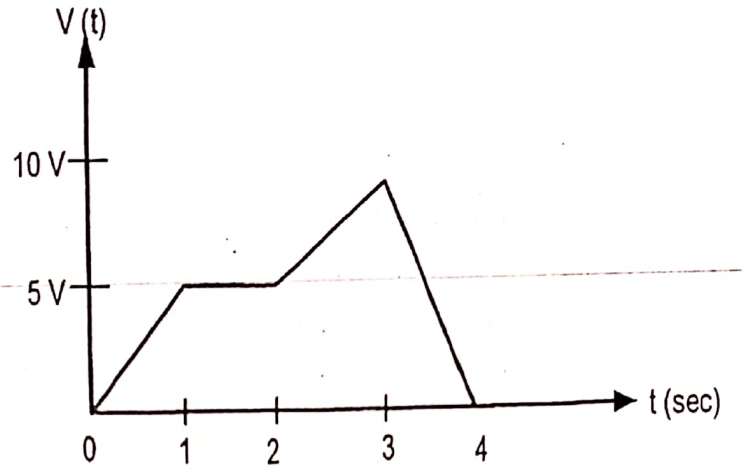
(b) For the following circuit, find the Norton's equivalent circuit with respect to the a-b terminals. **[17]**



SECTION-B

There are Four (4) questions in this section. Answer any Three (3)

5. **(a)** Find the current through the capacitor of value C=2mF, when the voltage across the capacitor is represented by the following figure. **[18]**



(b) A 60 Hz voltage of 250V effective value is applied across a capacitance of 50 μF. **[17]**

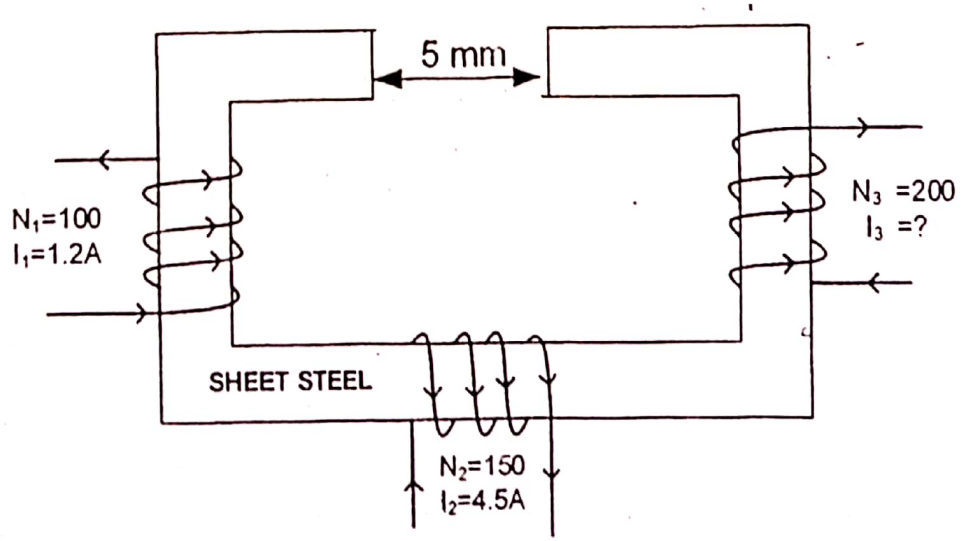
a) Write the time equations for the voltage and resultant current.
b) Find the maximum energy stored in the capacitance.

6. **(a)** Draw the hysteresis loop. What is the physical significance of the area inside the hysteresis loop. **[15]**

(b) Find the current I_3 required to establish the flux, $\varphi=4*10^{-4}$ wb in the following magnetic circuit. Mark the appropriate points on the B-H curve provided with the question and attach the page with your answer script. **[20]**

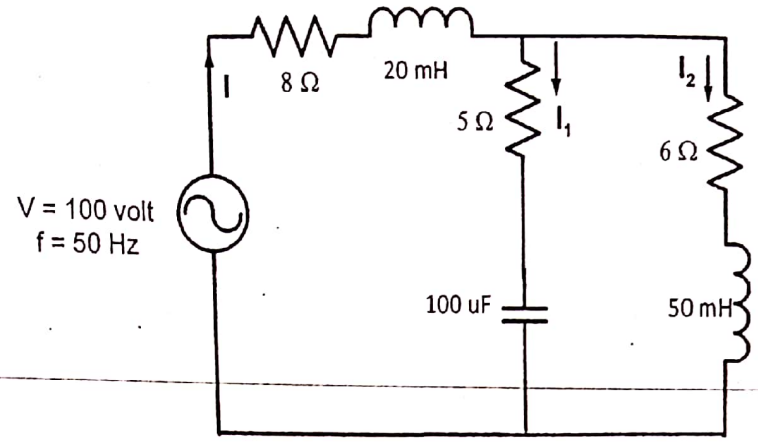
Area, A= 4 cm² (throughout)

$L_{Sheet\ steel}$ = 200cm



7. **(a)** The current passing through a R-L-C series circuit is, i= Im Sin ωt. Find out the expression of voltage, power and impedance for the circuit. **[17]**

(b) For the following circuit find Z_T, I, I_1, I_2. Here Z_T is the impedance seen from the 100V source. [18]



8. (a) An alternating voltage $v(t)=V_m \sin \omega t$ is applied across a capacitor C. Prove that energy stored by the capacitor during a quarter cycle is- [15]

$$W_c=1/2\ CV_m^2.$$

(b) A series circuit containing pure resistance and a pure capacitance, the current and voltage are expressed as- [20]

$i(t)=5 \sin(314t+140°)$ and $v(t)=25 \sin(314t+170°)$

Find out the value of impedance, resistance, capacitance and power factor of the circuit.

[18]

C.S.E. 1-2

Date: 29/03/16

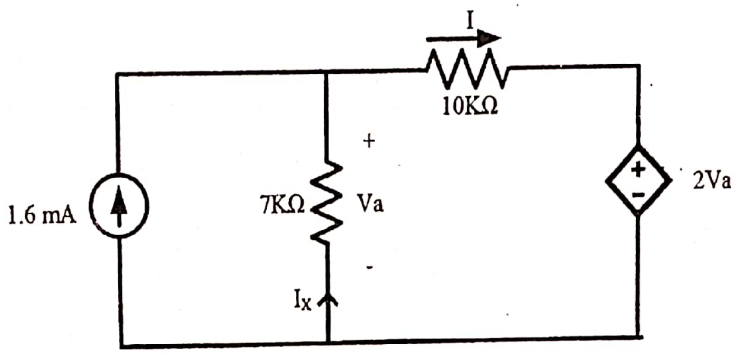
AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, FALL-2015
COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

TIME: 3 HRS **FULL MARKS: 210**

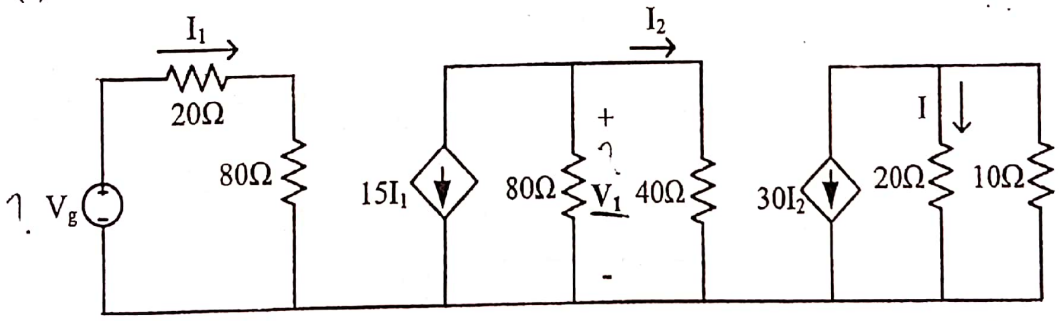
SECTION-A

There are Four(4) questions. Answer any Three(3)
Marks allotted for each question are indicated in the right margin

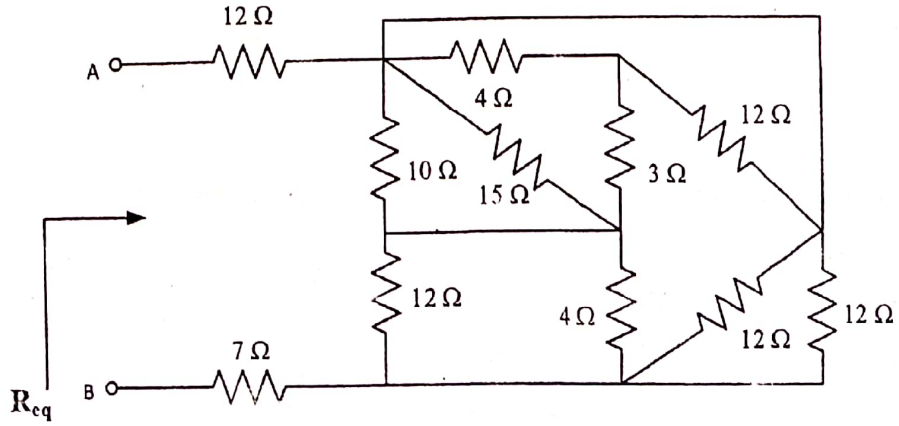
1. (a) State Ohm's law and KCL. Determine the value of current I and I_x for the following circuit. [15]



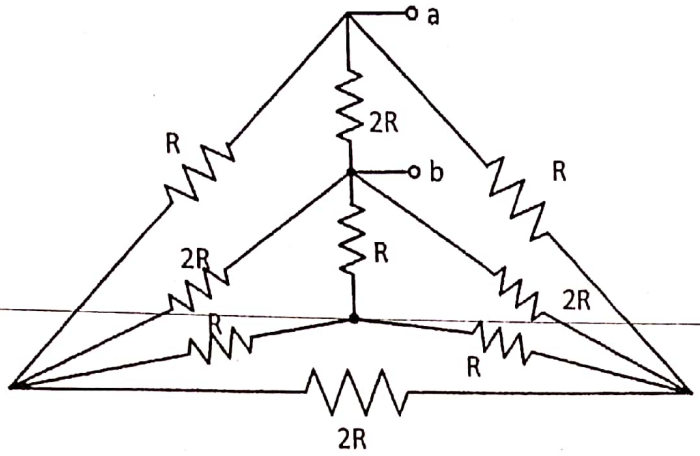
(b) Given current I= 3 A. Calculate the value of voltage Vg and V_1 for the following circuit. [20]



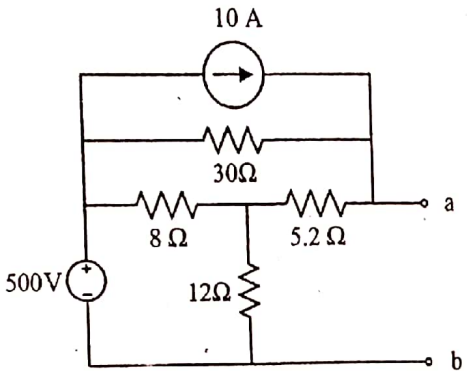
2. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also show that the efficiency for maximum power transfer is 50%. [17]
(b) Calculate the equivalent resistance at terminals A-B for the following circuit. [18]



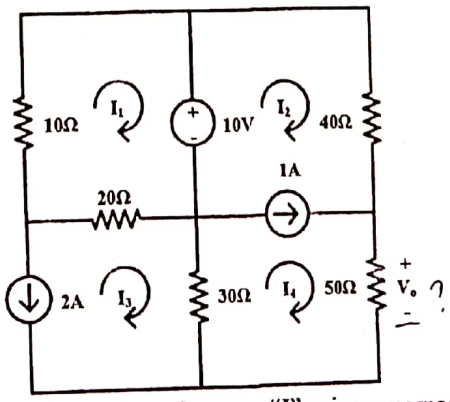
3. **(a)** Using Y-Δ and Δ-Y conversion, determine the equivalent resistance at terminals a-b for the following network. The value of resistance R is 10 KΩ. **[17]**



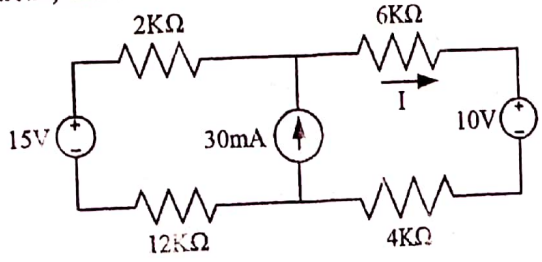
(b) For the following circuit, find the Thevenin's equivalent circuit with respect to the a-b terminals. **[18]**



4. **(a)** Using mesh current analysis, find out the value of voltage "V_o" for the following circuit. **[18]**



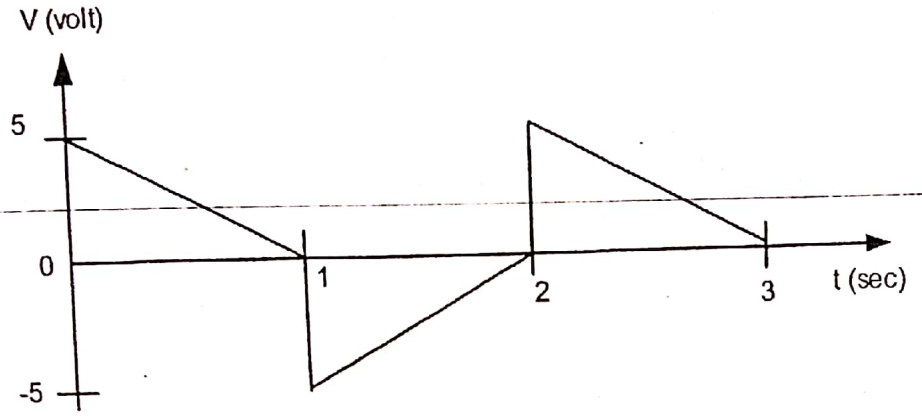
(b) For the following circuit, find the value of current "I" using superposition theorem. **[17]**



SECTION-B

There are Four (4) questions in this section. Answer any Three(3)

5. (a) The voltage across a capacitor of 2mF is represented by the following signal. Draw the current signal. **[18]**



(b) For a sinusoidal alternating voltage waveform, prove that- **[17]**

a) $V_{avg} = 0.636V_m$

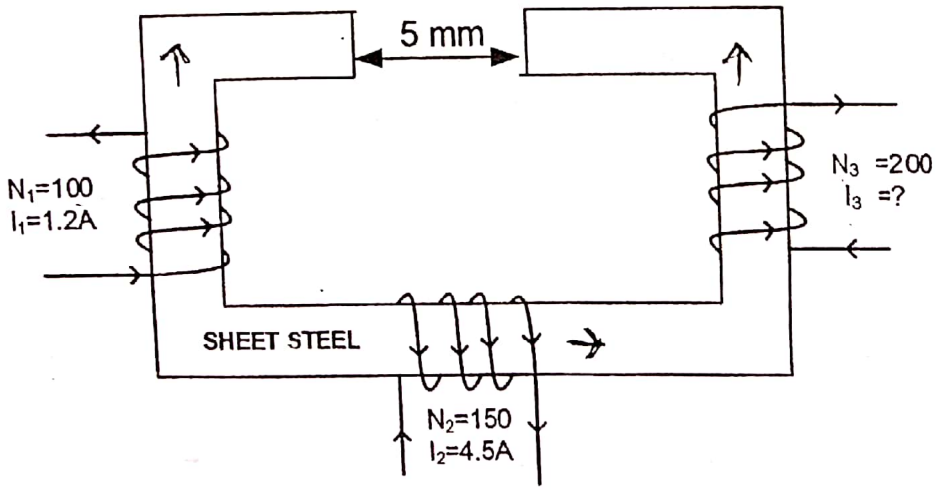
b) $V_{rms} = 0.707V_m$

6. (a) What do you mean by residual flux? State Right hand rule to determine the direction of the magnetic field around a current-carrying conductor. **[10]**

(b) Find the current I_3 required to establish the flux, $\varphi = 4*10^{-4}$ wb in the following magnetic circuit. Mark the appropriate points on the B-H curve provided with the question and attach the page with your answer script. **[25]**

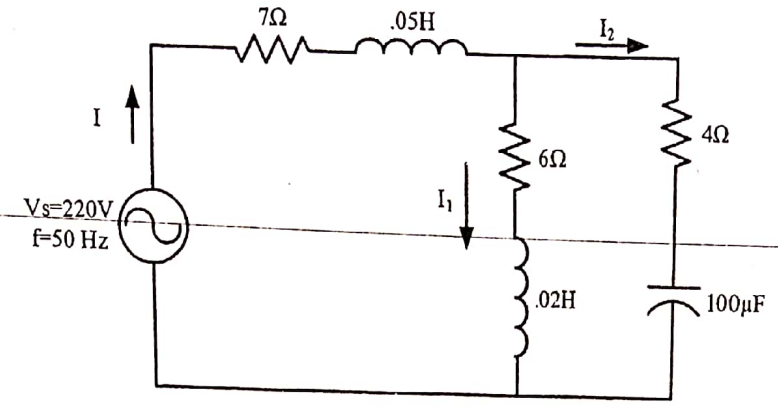
Area, A= 4 cm^2 (throughout)

$L_{Sheet\ steel}$= 200cm



7. (a) The current passing through R-L-C series circuit is, $i = I_m \sin \omega t$. Find out the expression of voltage, power and impedance for the circuit. [17]

(b) For the following network calculate the currents I, I_1 and I_2. Also find the power factor of the network. [18]



8. (a) An alternating voltage $v(t) = V_m \sin \omega t$ is applied to the capacitive circuit. Prove that energy received by the capacitor during a quarter cycle is $W_C = \frac{1}{2} C V_m^2$. [15]

(b) For an R-L-C series circuit the current and voltage are expressed as- [20]
$i(t) = 10 \sin (314t + 100°)$ and $v(t) = 40 \sin(314t + 170°)$

If the value of inductor is 50mH, determine the value of impedance, resistance, capacitance and power factor of the circuit.

06.15.2015

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

PROGRAM: COMPUTER SCIENCE AND ENGINEERING

1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, SPRING-2015

COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

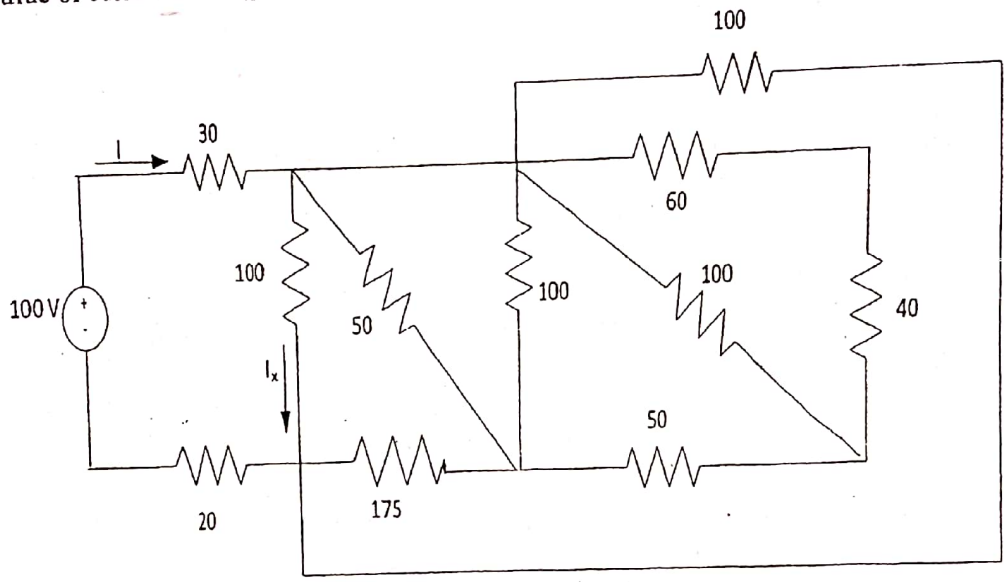
TIME: 3 HRS FULL MARKS: 210

There are Eight(8) questions. Answer any Six(6)

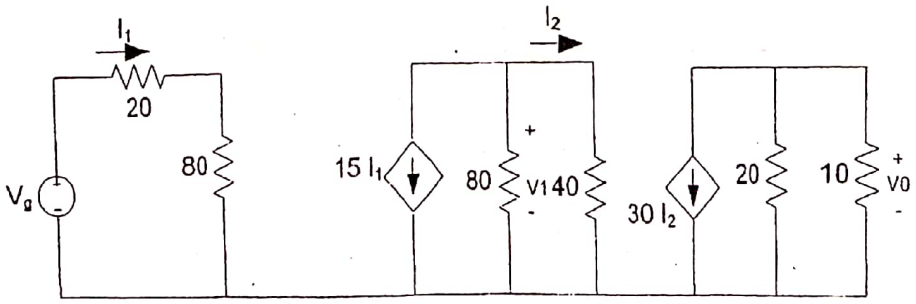
Marks allotted for each question are indicated in the right margin

(All resistances are in ohms if not specified)

(a) Find the value of current I and I_x for the following circuit. 15

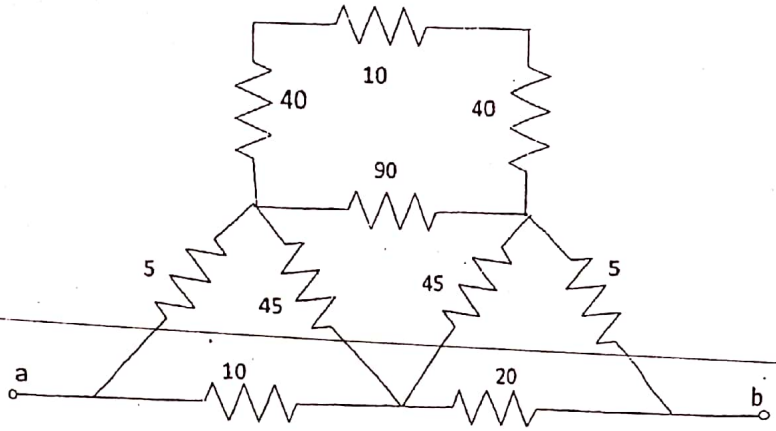


(b) Given voltage V0= 20v. Calculate the value of voltage Vg and V1 for the following circuit. 20



02. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also Show that the efficiency for maximum power transfer is 50%. 17

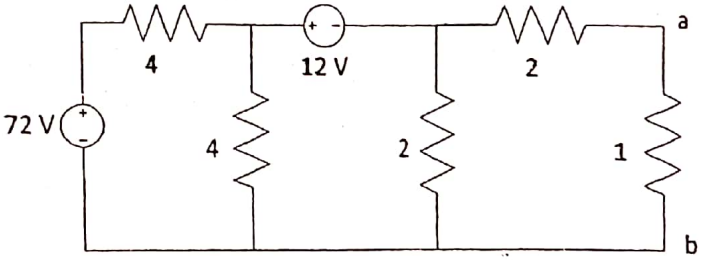
(b) Calculate the equivalent resistance at terminals a-b for the following circuit. 18



03.

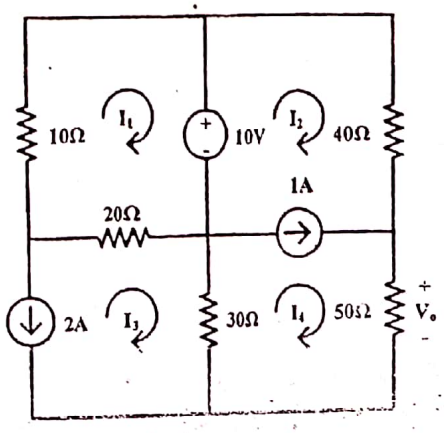
(a) Convert a T(Y) connected resistive network into its equivalent Pie (Delta) network. 17

(b) For the following circuit, find the Thevenin's equivalent circuit with respect to the a-b terminals. 18

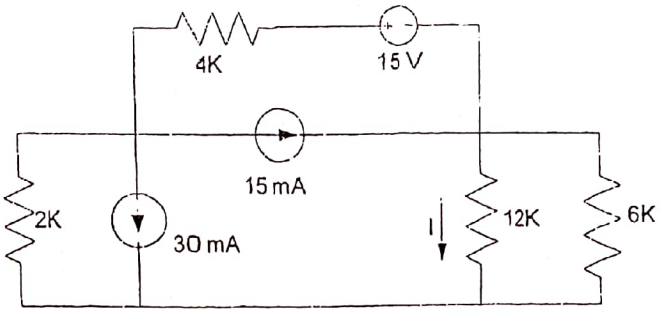


04.

(a) Using mesh current analysis to find out the value of voltage "V_o" for the following circuit. 18

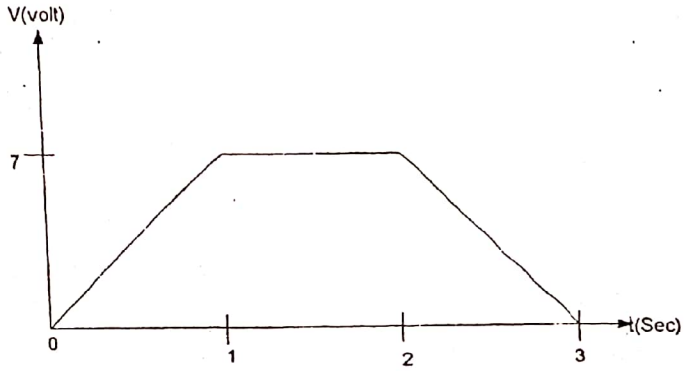


(b) For the following circuit, find the value of current "I" using superposition theorem. 17



05.

(a) The voltage across the capacitor of 2mF is represented by the following signal. Draw the current signal. 18



(b) For a sinusoidal alternating voltage waveform, prove that- 17

a) $V_{avg} = 0.636V_m$

b) $V_{rms} = 0.707V_m$

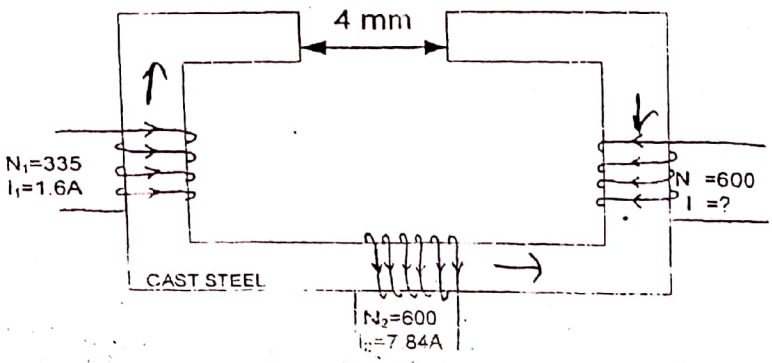
06.

(a) What is hysteresis loop for a ferromagnetic material. What is the physical significance of the area inside the hysteresis loop 15

(b) Find the current I required to establish the flux, $4*10^{-4}$ wb in the following magnetic circuit. A set of B-H curves is attached at the end of the question. Mark the appropriate points on the B-H curve and attach the page with your answer script. 20

Area, A= 4 cm^2 (throughout)

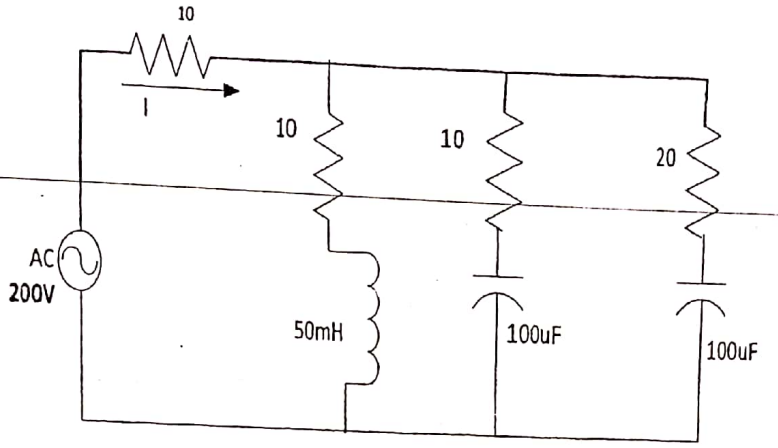
$l_{cast\ steel}$= 100cm



07.

(a) The current passing through an R-L-C series circuit is, $i = I_m \sin \omega t$. Find out the expression of voltage, power and impedance for the circuit. 17

(b) For the following circuit find the value of current I. Here frequency f=50 Hz. 18



08.

(a) An alternating voltage $v(t)=V_m \sin \omega t$ is applied to the inductive circuit. Prove that energy received by the inductor during a quarter cycle is- 15

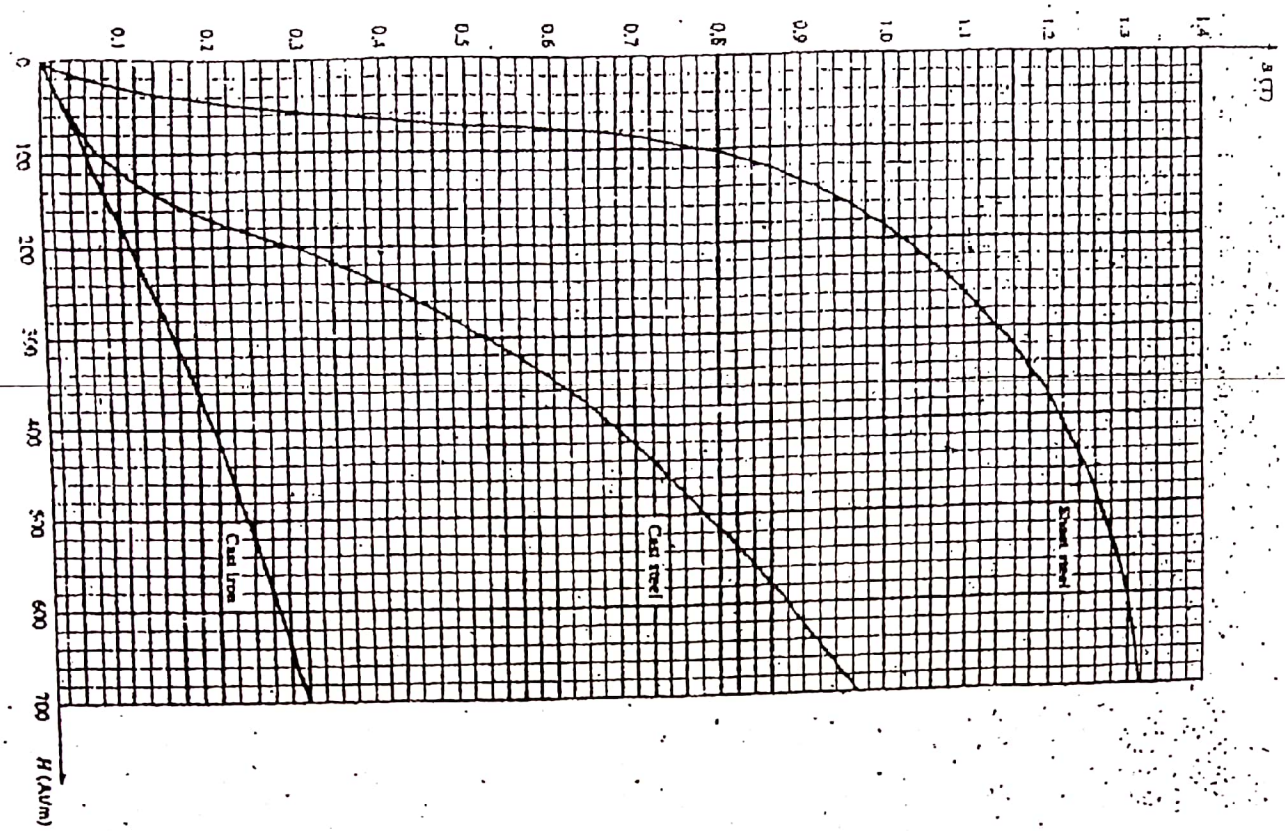
$$W_L = \frac{1}{2} * LI_m^2.$$

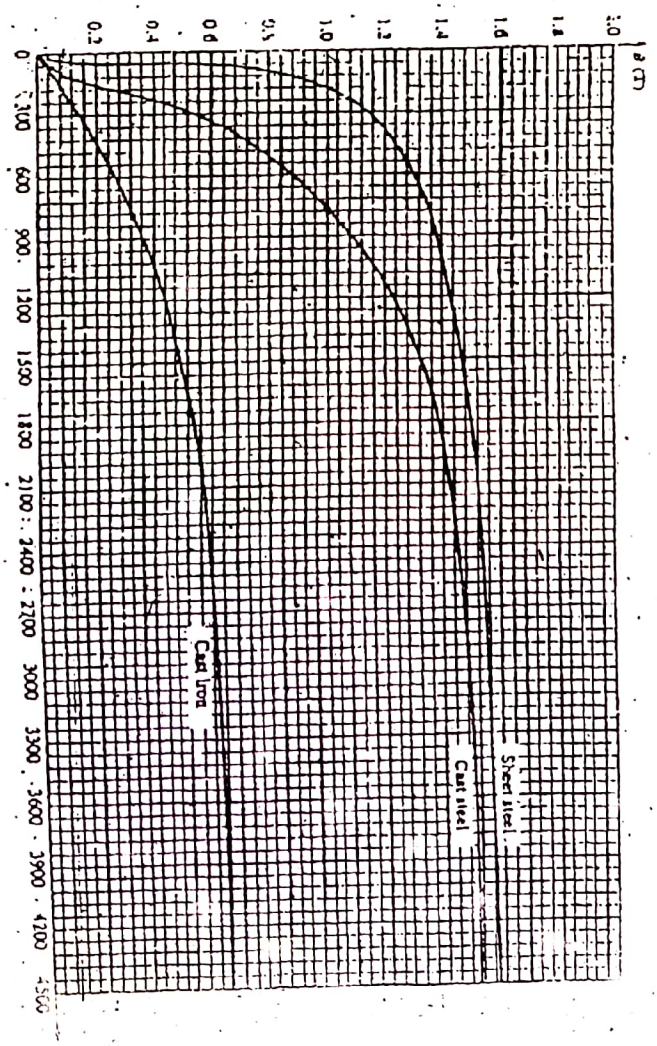
(b)

For an R-L series circuit the current and voltage are expressed as- 20

$i(t)=3 \sin(314t+120°)$ and $v(t)=15 \sin(314t+150°)$

Find out the value of impedance, resistance, inductance and power factor.





26-4-15

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, FALL-2014
COURSE NO.: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

TIME: 3 HRS FULL MARKS: 210

USE SEPARATE SCRIPT FOR EACH SECTION

SECTION-A

There are four(4) questions in this section. Answer any three(3)
Marks allotted for each question are indicated in the right margin

1.

(a) In the network shown in fig. – 1(a), the 16 Volt source supplies 32 Watt power to the network. Using KVL & KCL, find the Voltage, V_S. [20]

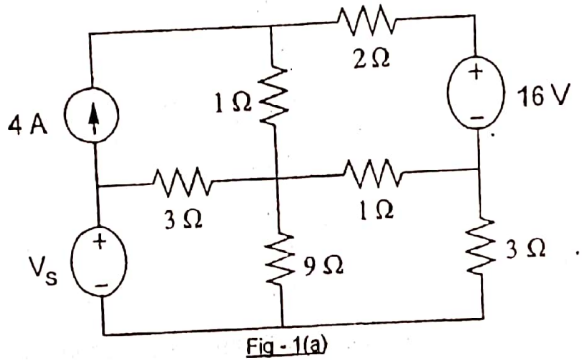


Fig - 1(a)

(b) Using KVL and KCL, find the Power absorbed by the 4Ω resistor in the network shown in Fig. – 1(b). [15]

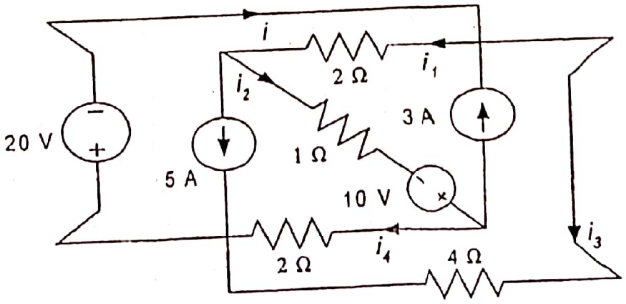


Fig - 1(b)

2. (a) Find the Equivalent resistance, R_{eq} in the network shown in Fig. – 2(a). [20]

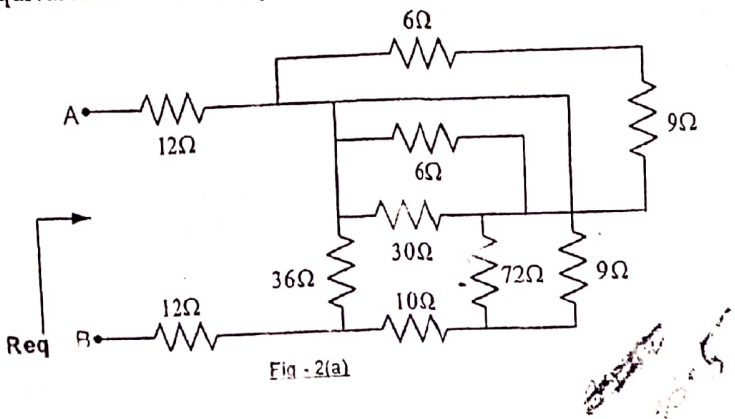


Fig - 2(a)

(b) Use Wye - Delta - Wye transformation to find the current, I_0 for the circuit shown in Fig. 2(b). [15]

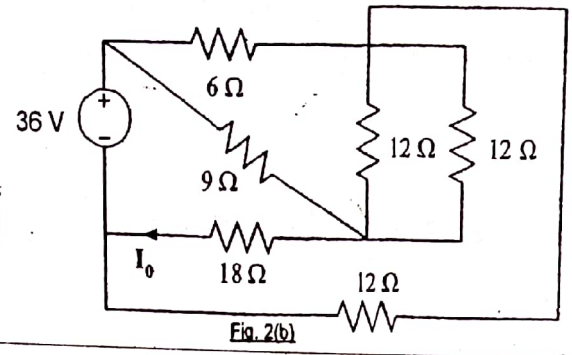


Fig. 2(b)

3.

(a) Use Node – Voltage method to find the current, I_X and the voltage, V in the network shown in the Fig. – 3(a). [20]

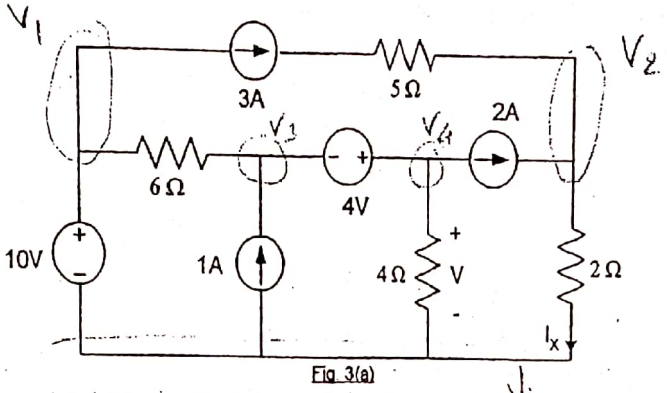


Fig. 3(a)

(b) Use Mesh/Loop Analysis to find the voltage, V_0 in the network shown in Fig.– 3(b). [15]

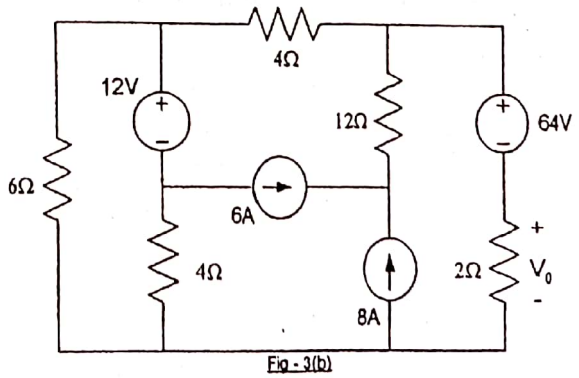


Fig - 3(b)

4.

(a) A Resistor R_L is connected across the terminals a,b in the network shown in fig.- 4(a). Find the value of resistor R_L so that maximum power is transferred to the resistor R_L. Also find the maximum power delivered to R_L. [20]

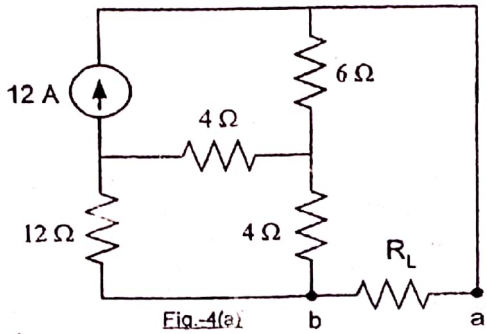


Fig.-4(a)

4. (b) If a resistive network containing independent and dependent sources delivers power to a load resistor R_L, then derive the condition under which maximum power is delivered to R_L by the network. Also show the expression for maximum power and efficiency. [15]

SECTION-B

There are four(4) questions in this section. Answer any three(3)

Marks allotted for each question are indicated in the right margin

5. (a) Use the Principle of Superposition to find the Current, I_0 in the network in fig – 5(a). [20]

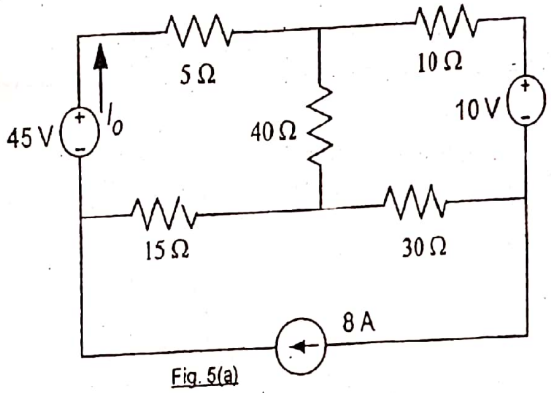


Fig. 5(a)

(b) A sinusoidal voltage of $V = V_m \sin\omega t$ is passing through a pure inductor whose inductive reactance is X_L. Show that the impedance of the inductor is - [5]

$$Z_L = X_L \angle 90^\circ$$

6. (a) Use series of Source Transformation to find the voltage, V_0 in the network shown in fig. – 6(a). [20]

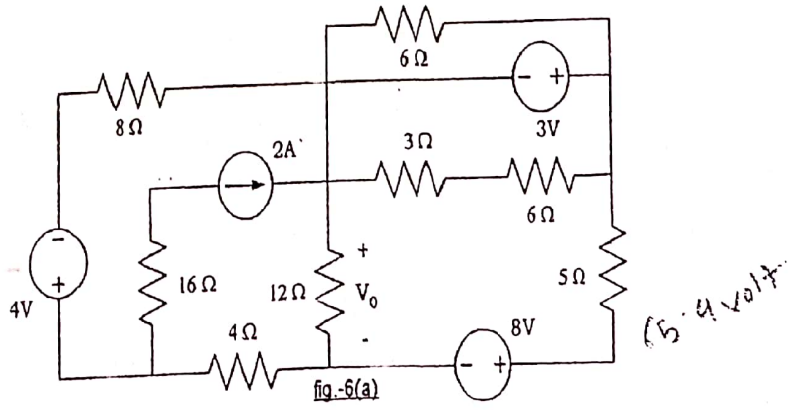


fig.-6(a)

(b) The voltage of a circuit is $v = 200 \sin \omega t$ volts and the current is $i = 50 \cos(\omega t - 30^\circ)$ amperes. Draw the wave shapes and find the phase difference between voltage and current. Also find the power factor. [15]

7.

(a) Find the total impedance, Z_T and the voltage, V_{ab} in the network shown in fig.- 7(a). [20]

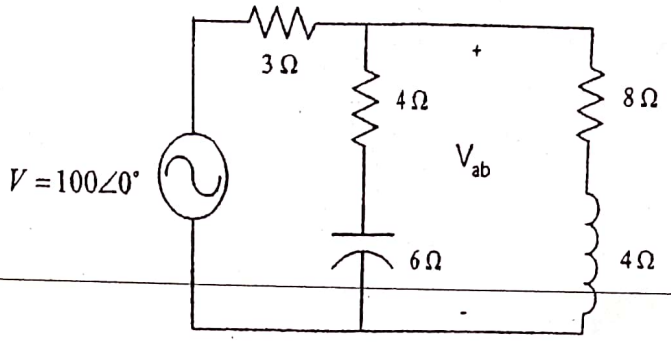


Fig.- 7(a)

(b) A voltage, V = 282.8 sin 500t applied to a series R-L-C circuit which produce a current, I = 5.656 sin (500t – 36.87°) ampere. If the capacitor value is 100μF then determine the value of resistor R in ohm and inductor in Henry. [15]

8.

(a) Find the ~~number of turns N_3~~ current I_3 required to establish a flux in the air gap of $\Phi_g = 6 \times 10^{-3}$ Weber in the magnetic circuit shown in Fig. – 8(a). [20]

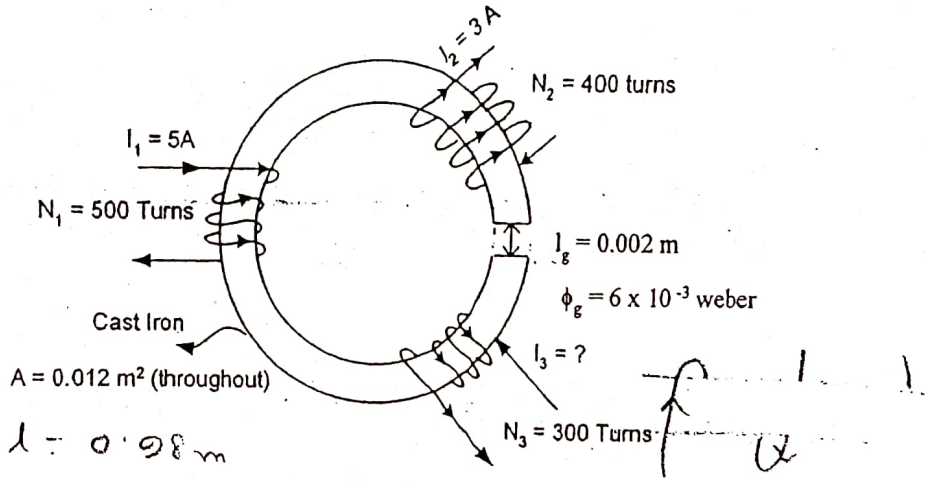


Fig - 8(a)

(b) Determine the primary current I_1 for the transformer of Fig. – 8(b) if the resultant clockwise flux in the core is 1.8×10^{-4} Weber. Also determine the Reluctance of the core. [15]

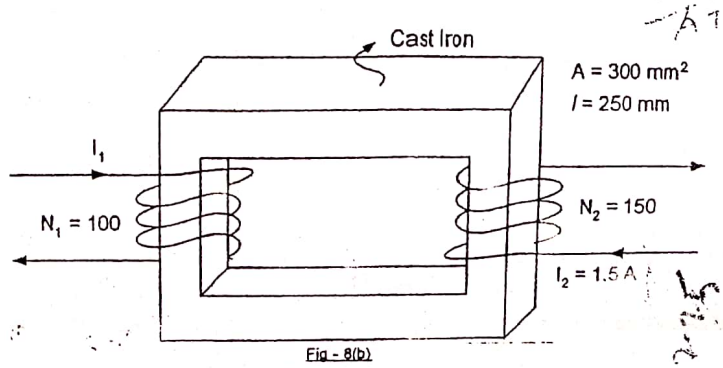


Fig - 8(b)