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

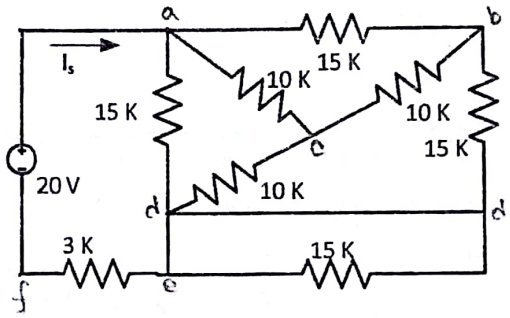
SECTION-A

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

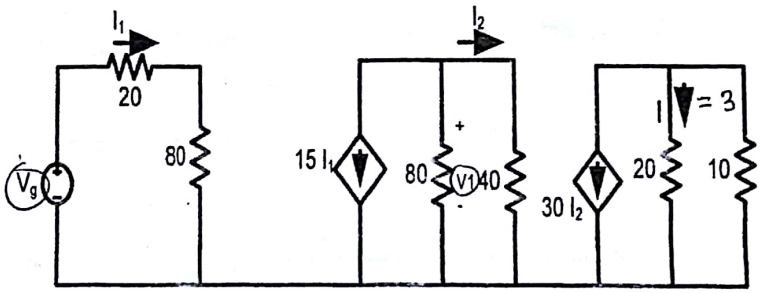
Marks allotted for each question are indicated in the right margin
(All resistances are in ohms if not specified)

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



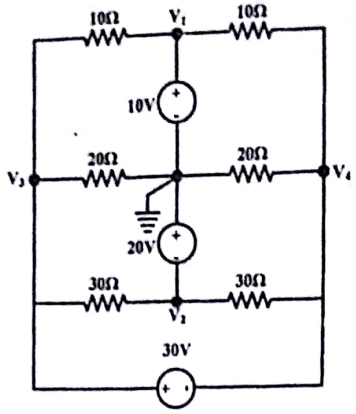
(b) Given current I= 3 A. Calculate the value of voltage Vg and V_1 for the following circuit. 20



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

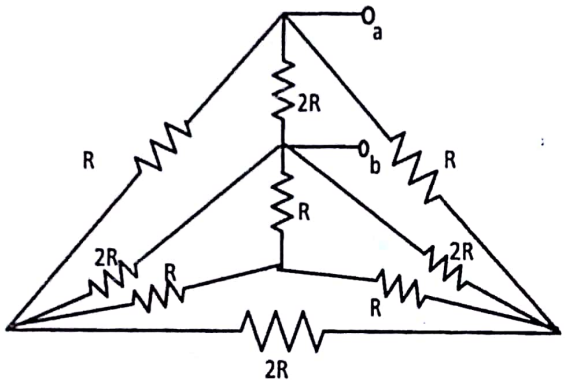
(a) Using me

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

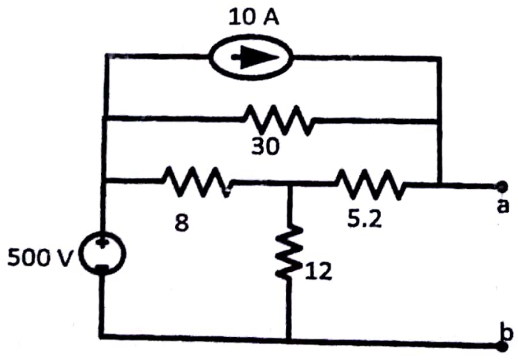


03.

(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**

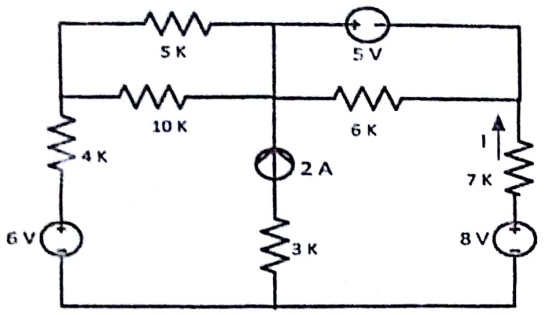


(b) For the following circuit, find the Norton's equivalent circuit with respect to the a-b terminals. **18**

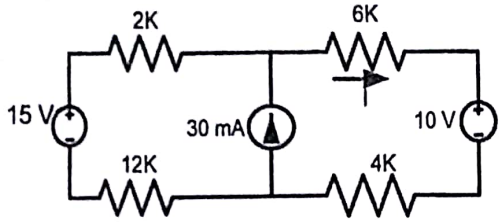


04.

(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

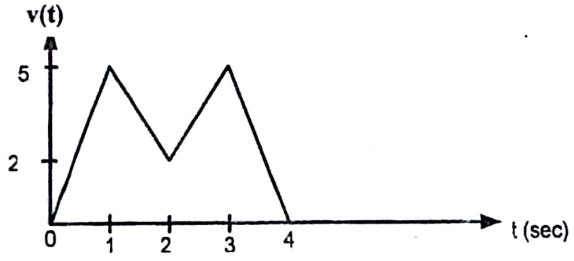


SECTION-B

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



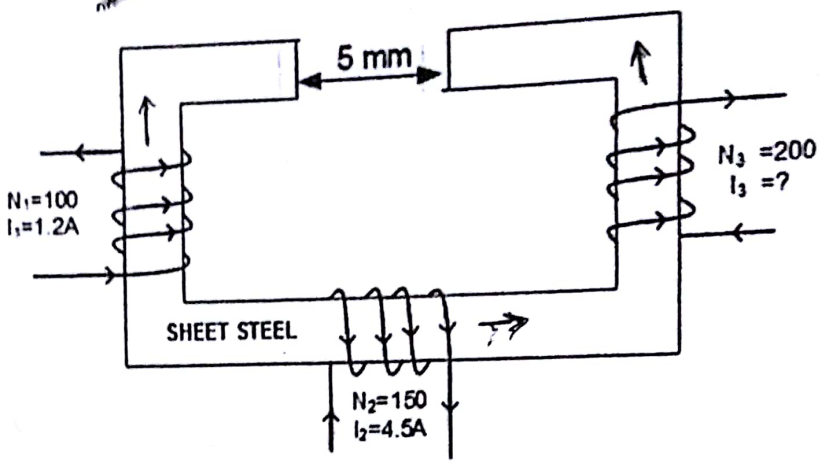
(b) Let, the current equation of a circuit be represented by i= -2 cos(ωt-60°) and the voltage equation by v =3 sin(ωt-150°). Draw the voltage and current wave shapes. What is the phase difference between voltage and current? Let us say, a 4A dc component is added to the current wave shape. Sketch the 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. 20

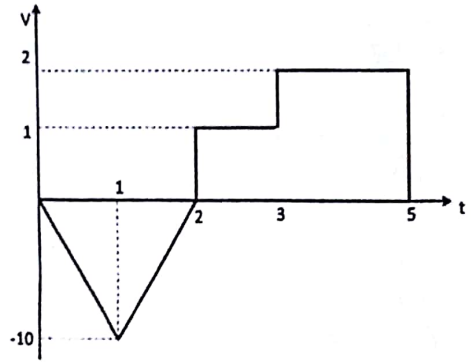
(b) Find the current I required to establish the flux, $4*10^{-4}$ wb in the following magnetic circuit. A set of B-H curve is attached at the end of the question. Mark the appropriate points on the B-H curve and attach the page with your answer script.

Area, A= 4 cm^2 (throughout)

$l_{sht\ steel}$= 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

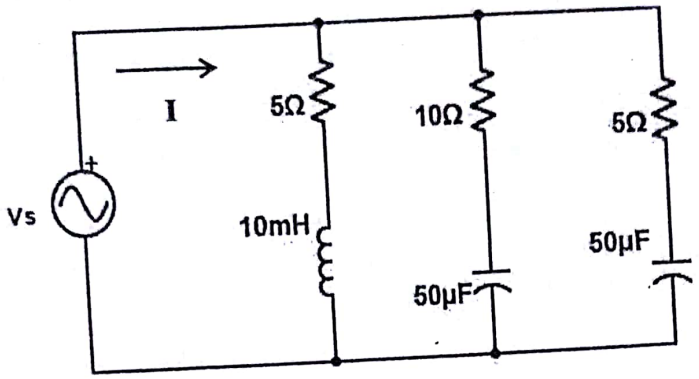
(i) Write the expression for current and voltage equations.
(ii) Find the value of resistor and capacitor of the circuit.
(iii) Find the total real, reactive and apparent power.
(iv) What is the power factor of the circuit?

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- $W_L = \frac{1}{2} * LI_m^2$; I_m=peak value of current **15**

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

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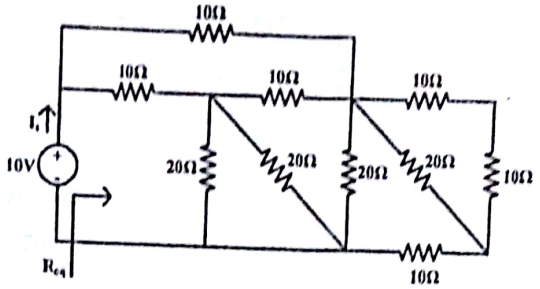
1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, SPRING-2016
COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

TIME: 3 HRS FULL MARKS: 210

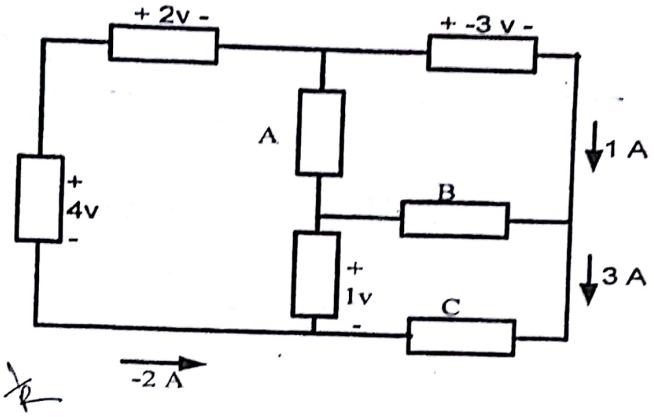
SECTION-A

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]

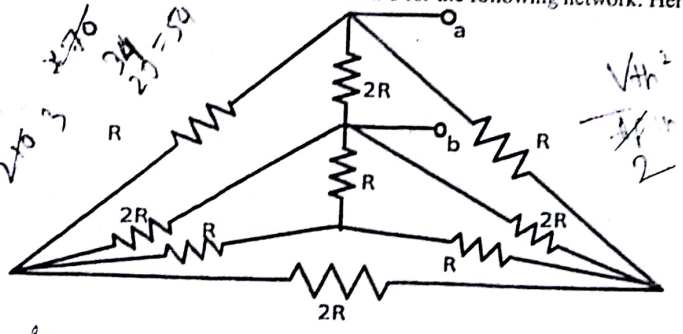


(b) State Ohm's law. For the following circuit find the value of Power to the element A, B and C. [20]



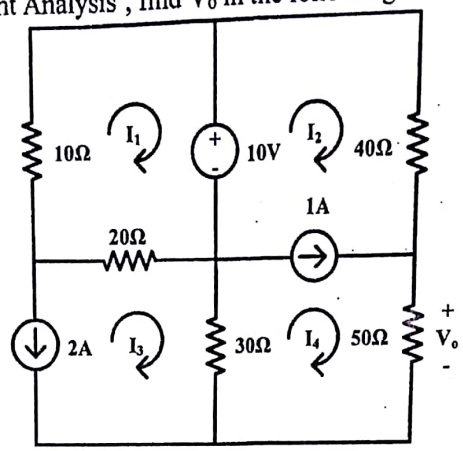
2. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also show that the efficiency for maximum power transfer is 50%. [17]

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

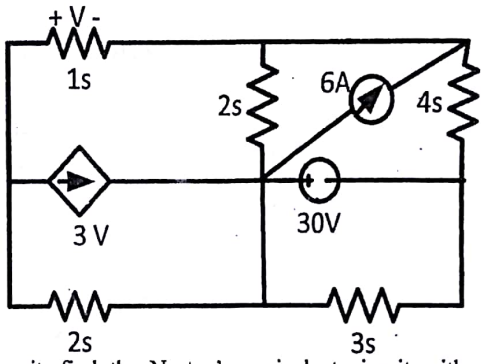


3. (a) Convert a Pie (delta) connected resistive network into its equivalent T(Y) network.

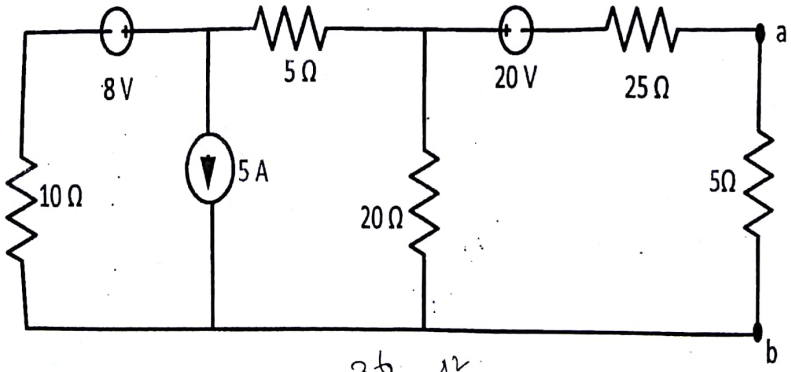
(b) Using 'Mesh Current Analysis', find V_o in the following circuit.



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



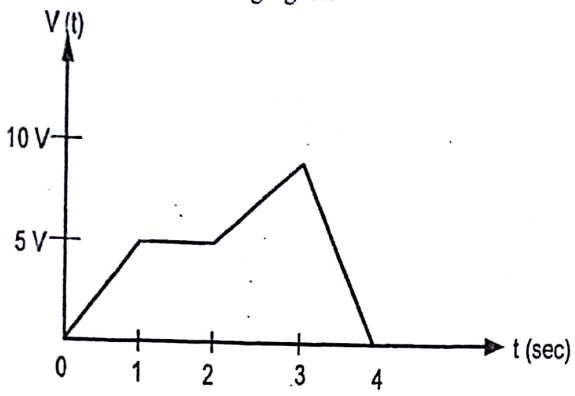
(b) For the following circuit, find the Norton's equivalent circuit with respect to the a-b terminals. **[17]**



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]**



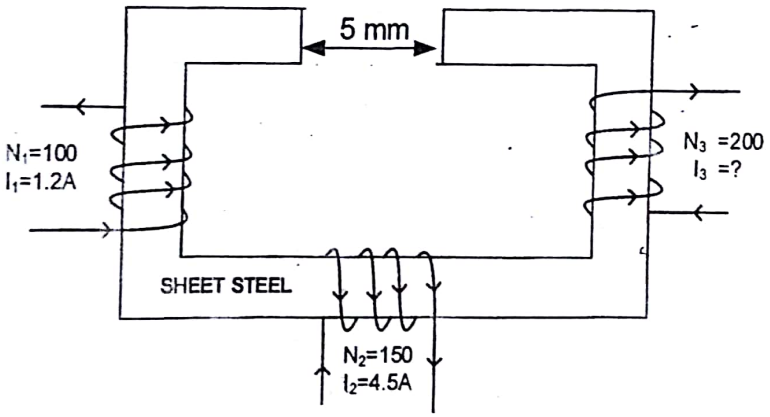
(b) A 60 Hz voltage of 250V effective value is applied across a capacitance of 50 μF. **[17]**

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]**

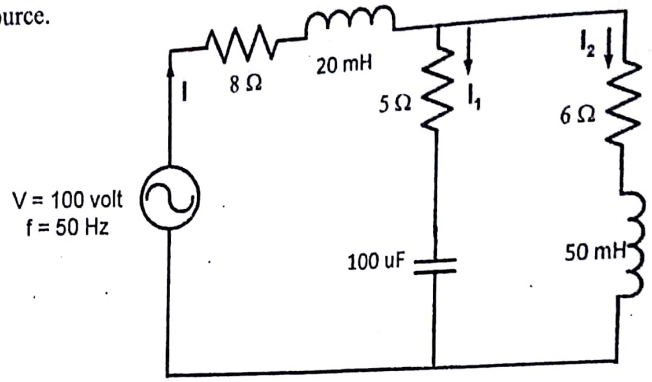
(b) Find the current I_3 required to establish the flux, $\varphi=4*10^{-4}$ wb in the following magnetic circuit. Mark the appropriate points on the B-H curve provided with the question and attach the page with your answer script. **[20]**

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.



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-

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

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

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

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

RC

$V_{rms} = \frac{V_m}{\sqrt{2}}$

$V_m \omega C = I_m$

$V_m \omega C = I_m$

$\omega = \frac{I_m}{V_m}$

$V = iR$

$V_{rms} = \frac{0.707 V_m}{\sqrt{2}}$

$Z_{RC} = \sqrt{R^2 + X_C^2} \angle \tan^{-1} \frac{X_C}{R}$

$W = \frac{1}{2} C V_m^2$

$P = V_{rms} I_{rms}$

$\frac{V_m I_m}{2} \cos\theta - \frac{V_m I_m}{2} \sin 2\omega t \sin\theta$

$\frac{V_m I_m}{2} \cos 2\omega t \cos\theta$

C.S.E. 1-2

Date: 29/03/16

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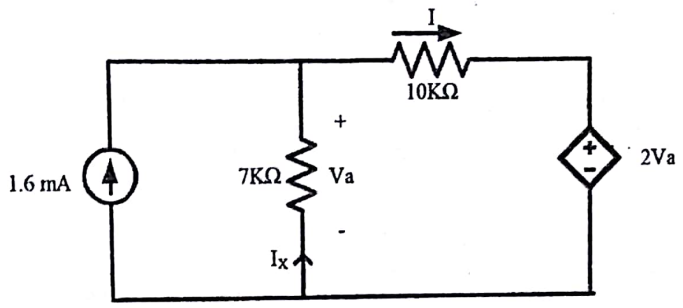
1ST YEAR 2ND SEMESTER, FINAL EXAMINATION, FALL-2015
COURSE NO: EEE-1241 COURSE TITLE: BASIC ELECTRICAL ENGINEERING

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

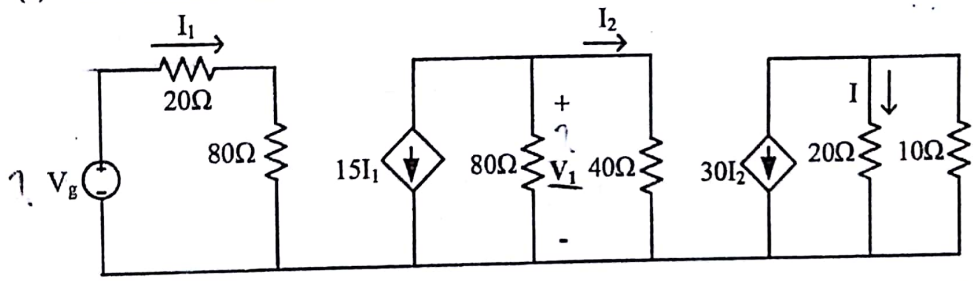
SECTION-A

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

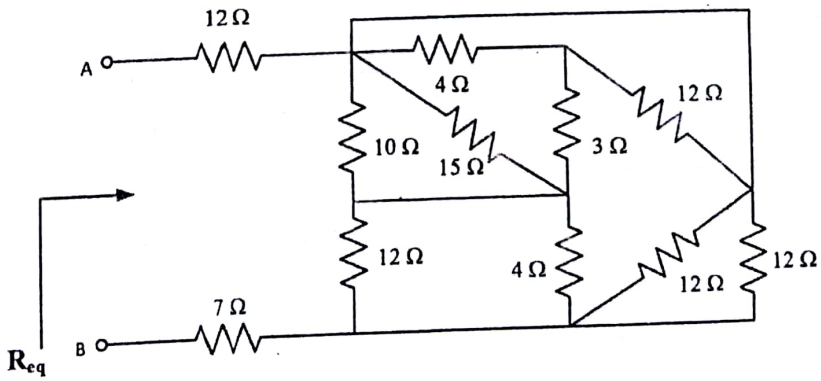
1. (a) State Ohm's law and KCL. Determine the value of current I and I_x for the following circuit. **[15]**



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

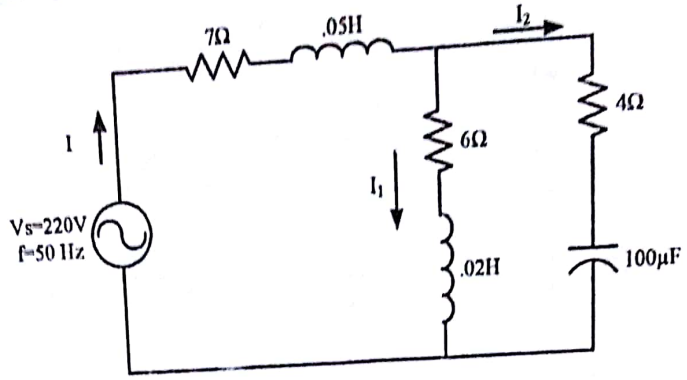


2. (a) State Maximum power transfer theorem and prove that, $P_{max} = V_{th}^2/4*R_{th}$. Also show that the efficiency for maximum power transfer is 50%. **[17]**
(b) Calculate the equivalent resistance at terminals A-B for the following circuit. **[18]**



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. [18]

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

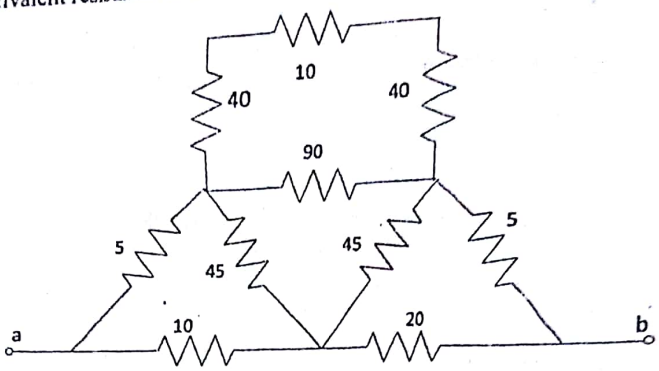


8. (a) An alternating voltage $v(t)=V_m \sin \omega t$ is applied to the capacitive circuit. Prove that energy received by the capacitor during a quarter cycle is $W_C = \frac{1}{2} C V_m^2$. [15]

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

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

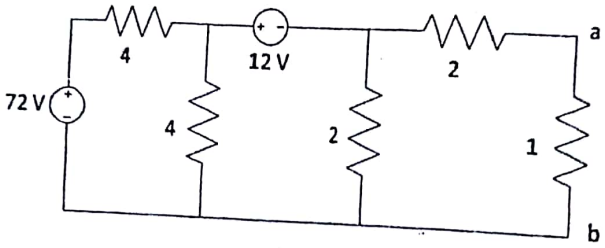
(b) Calculate the equivalent resistance at terminals a-b for the following circuit.



03.

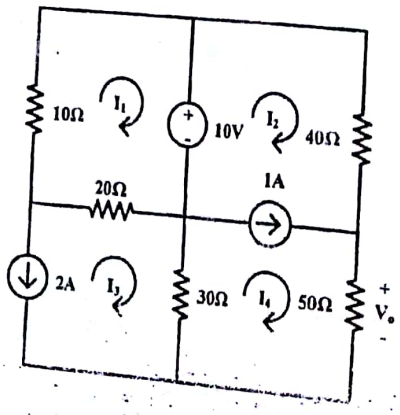
(a) Convert a T(Y) connected resistive network into its equivalent Pie (Delta) network. **17**

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

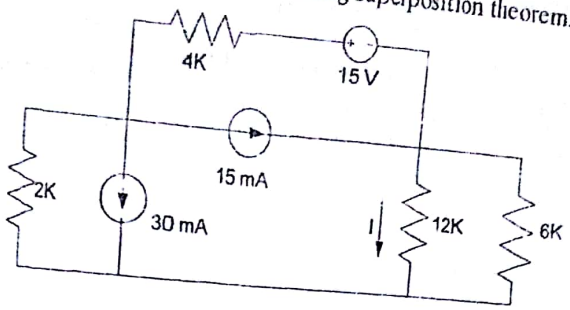


04.

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

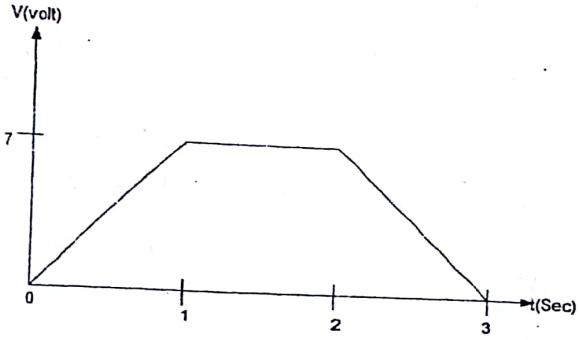


(b) For the following circuit, find the value of current "I" using superposition theorem. 17



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) $V_{rms} = 0.707V_m$

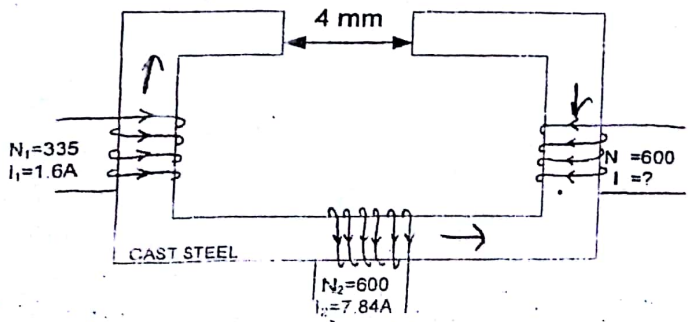
06.

(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

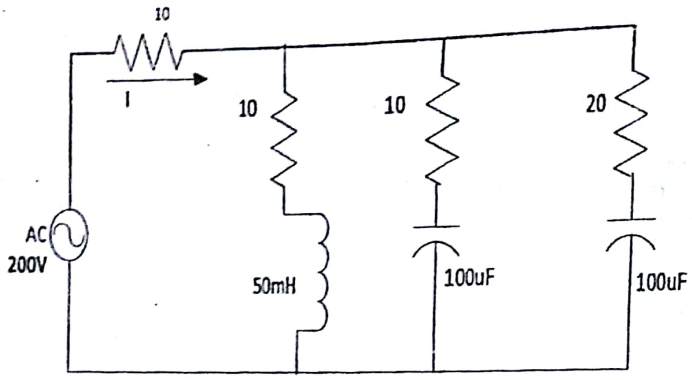
Area, $A = 4\ cm^2$ (throughout)

$l_{cast\ steel} = 100cm$



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



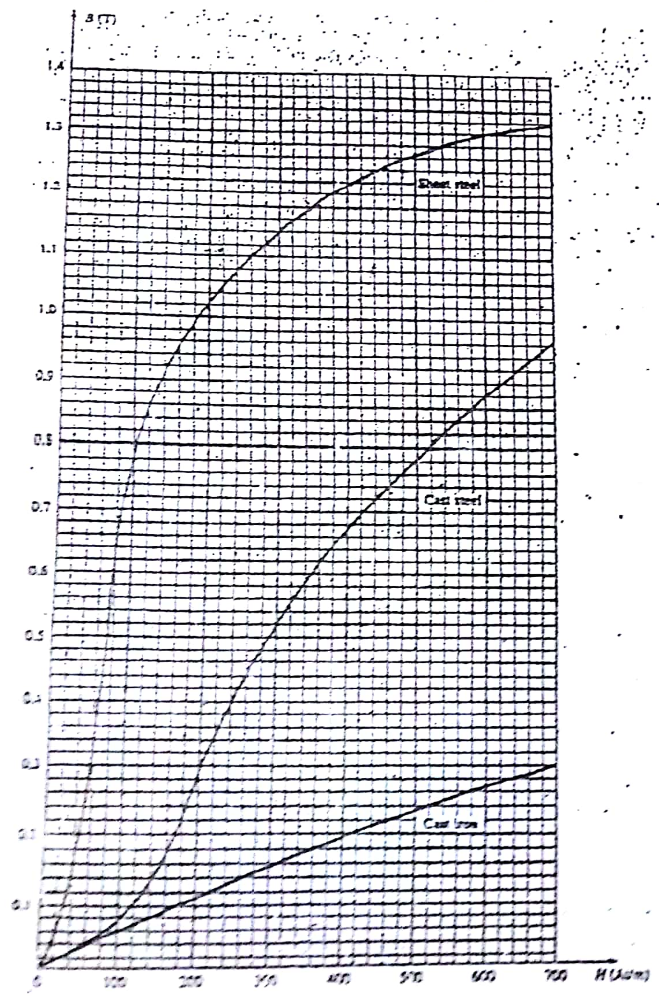
08. (a) An alternating voltage $v(t)=V_m \sin \omega t$ is applied to the inductive circuit. Prove that energy received by the inductor during a quarter cycle is- 15

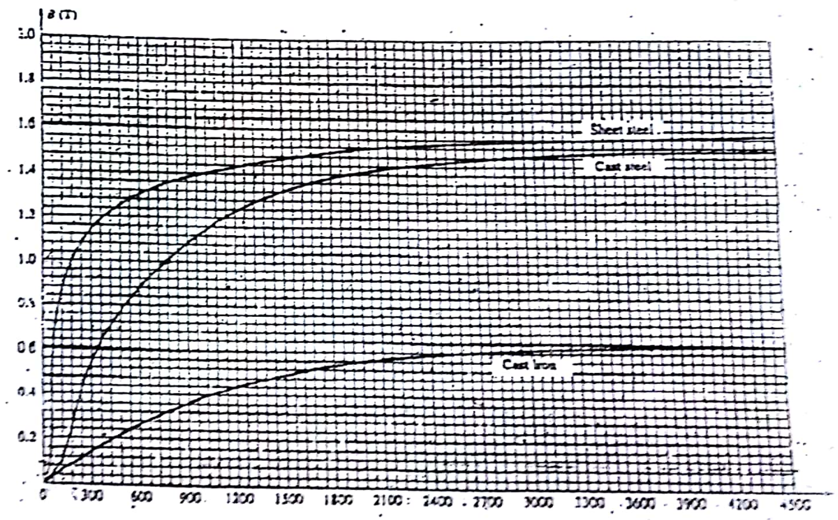
$$W_L = \tfrac{1}{2} * LI_m^2.$$

(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]

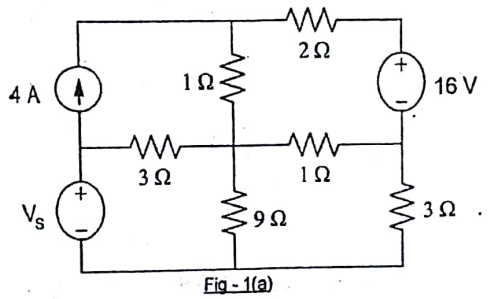


Fig - 1(a)

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

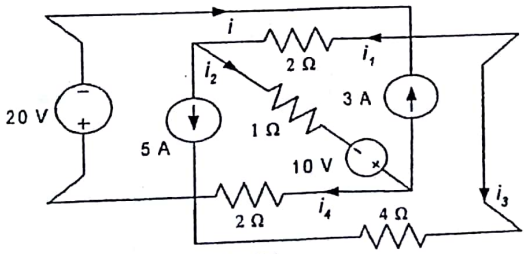


Fig - 1(b)

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

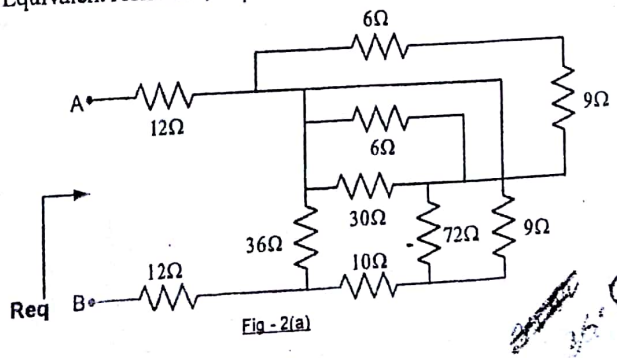


Fig - 2(a)

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

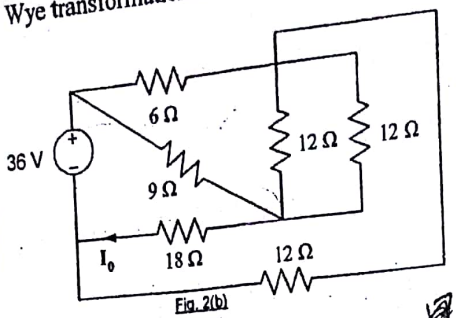


Fig. 2(b)

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]

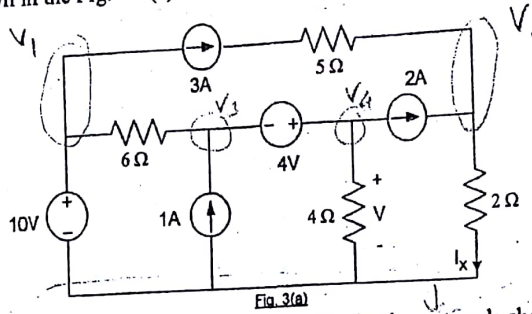


Fig. 3(a)

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

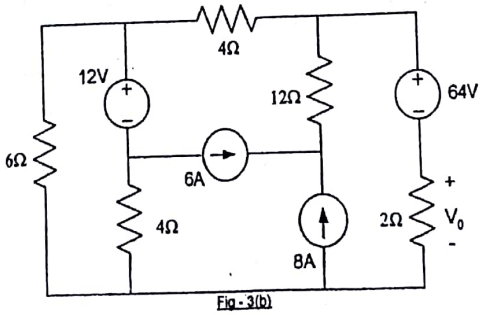


Fig - 3(b)

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]

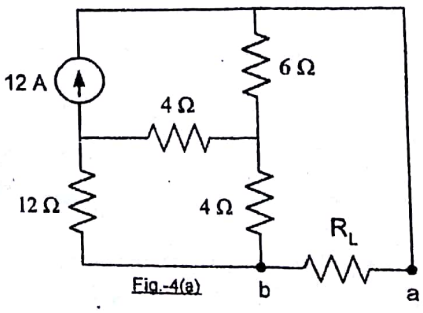


Fig.-4(a)

(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]

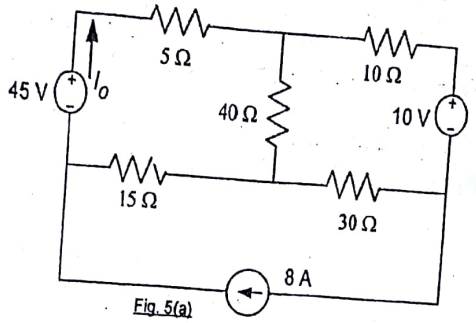


Fig. 5(a)

(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]

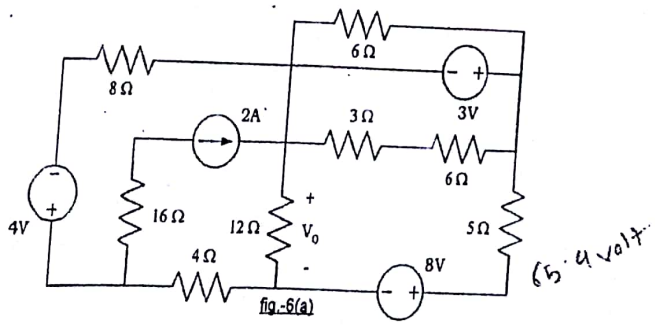


fig.-6(a)

(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]

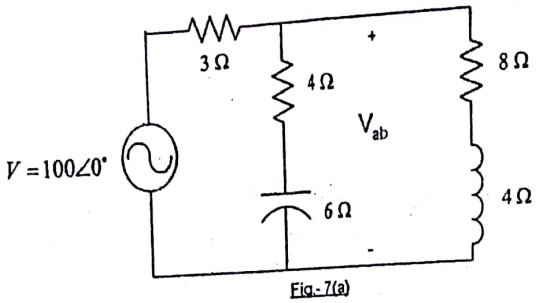


Fig.- 7(a)

(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]

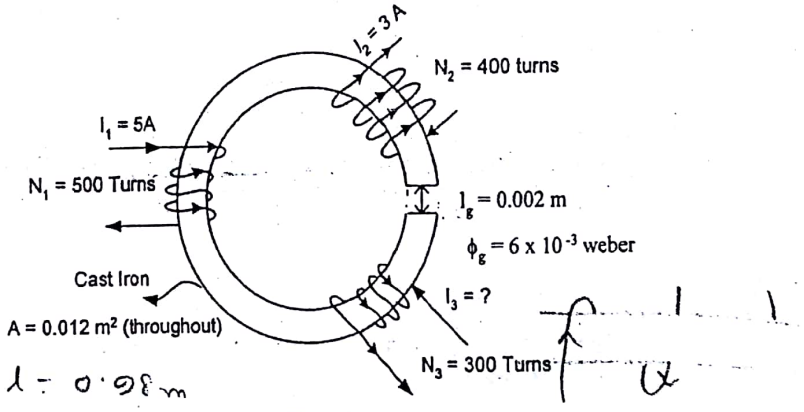


Fig - 8(a)

(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]

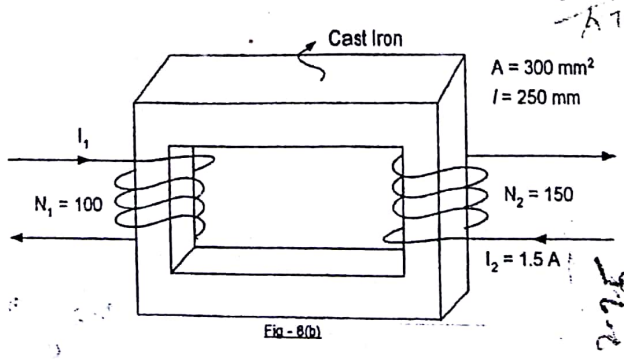


Fig - 8(b)

Date : 25.08.2014

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1ST YEAR 2ND SEMESTER

FINAL EXAMINATION, SPRING-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

01 (a) Find the form factor of the following wave shape of Figure: 1(a) 20

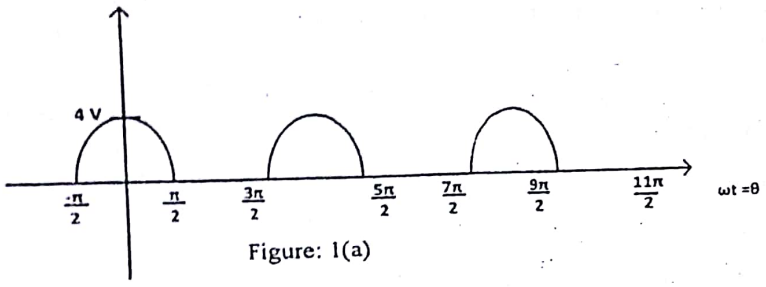


Figure: 1(a)

(b) The peak value of sinusoidal 60 Hz ac voltage and current is 20V and 5A respectively. The instantaneous value of voltage, v=17.32 V and current, i= - 2.5 A at t=0ms.i) Write down the expression for v and i. 15

ii) Sketch v and i and find the phase difference between them.

02 23

(a) For the following Figure: 2(a)

i) Find total impedance Z_T , total admittance Y_T

ii) Find current I, I_1, I_2 and draw the phasor diagram showing E,I, $I_1$and I_2

iii) Find the voltage V_x shown in the figure.

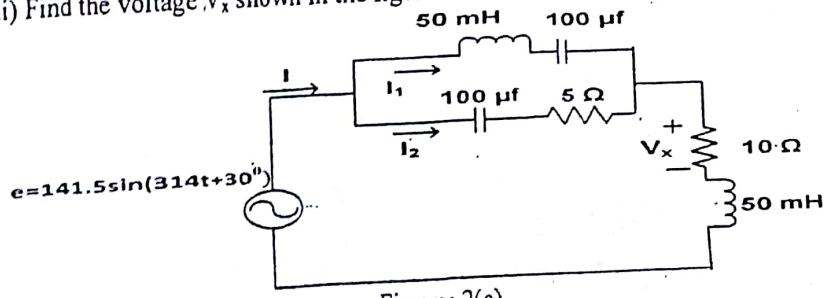
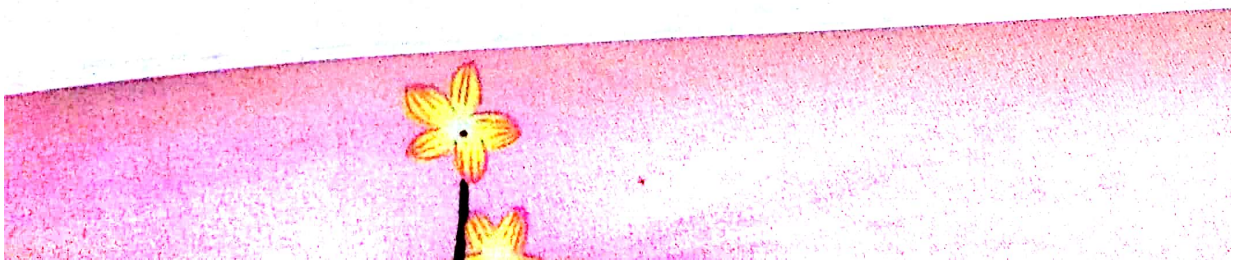


Figure: 2(a)

(b) For the following circuit of Figure: 2(b) 12

i) Draw the power triangle showing total real power, reactive power and apparent power.

ii) Find the total power factor.



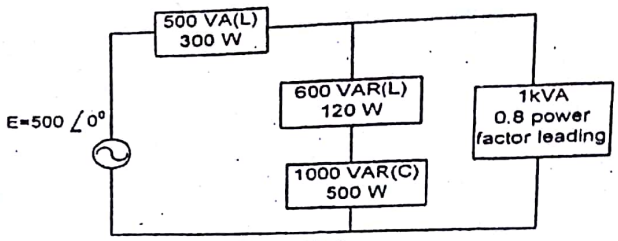


Figure: 2(b)

03

(a) A pure inductor of L Henry is connected in series with a voltage source of $V = V_m \sin\omega t$. Show that the energy delivered to the circuit during quarter of a cycle is $W_L = \frac{1}{2} LI_m^2$. 10

(b) Find the V-I relationship of a Capacitor and show that $Z_c = \frac{1}{\omega c} \angle -90^0$ and average power of a capacitor is zero. Draw the instantaneous voltage, current and power waveshapes. 12

(c) Suppose $V = V_m \sin(\omega t + \Theta)$ and $I = I_m \sin\omega t$. Find the instantaneous power and from that find the real power and reactive power of a resistor. 10

(d) What is the frequency effect on an inductor? 03

04

(a) Write analogy between electric circuit and magnetic circuit. 06

(b) Write Faraday's Law of electromagnetic induction. 06

(c) Observe the magnetic circuit of Figure: 4(b), where the radius of the core is r=0.3m, flux $\Phi = 4 \times 10^{-4}$ Wb, area A=20 cm^2 (throughout), length of the air gap 0.002 m, N_1=200 turns, N_2=40 turns and I_2=0.3A. 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. 23

i) Draw the equivalent electrical circuit and magnetic circuit.
ii) Find the current I_1.
iii) Find the reluctance of the airgap.
iv) Find the relative permeability of the sheet steel.

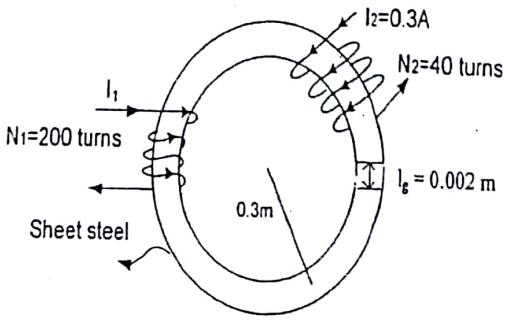


Figure: 4(b)

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

05

(a) Using KVL & KCL, determine the currents, I_x & I_y and voltage, V_x in the network shown in Figure-5(a) & show for this network that, "power developed=power absorbed" 20

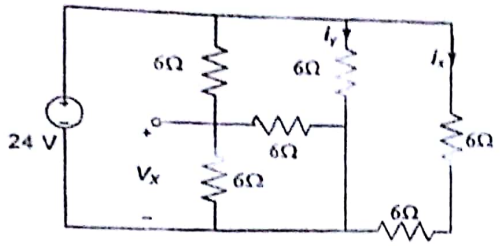


Figure-5(a)

(b) Use Source Transformation to find the current, I_o in the network shown in Figure- 5(b) 15

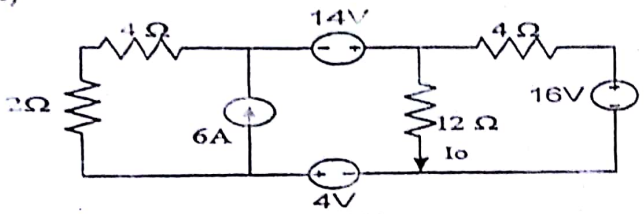


Figure-5(b)

06

(a) Convert a '**Delta**' connected resistive network into its equivalent '**Y**' network. 17

(b) Find the value of resistance, **Req** for the following network shown in Figure- 6(b) 18

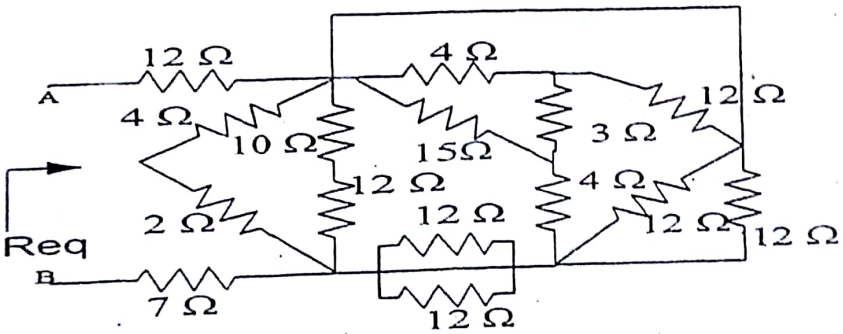


Figure-6(b)

07

(a) Use Nodal analysis to find the voltage, **Ix** in the network shown in Figure- 7(a). 20

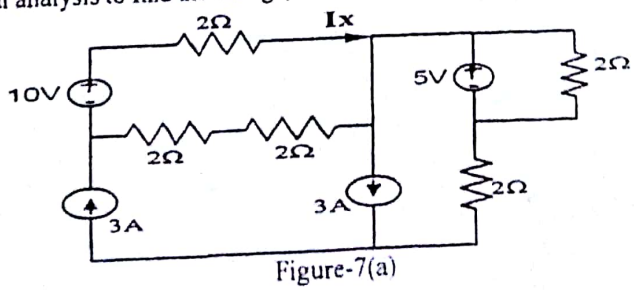


Figure-7(a)

(b) Use Mesh Analysis to find the current I_1, I_2, I_3 in the network shown in Figure: 7(b). 15

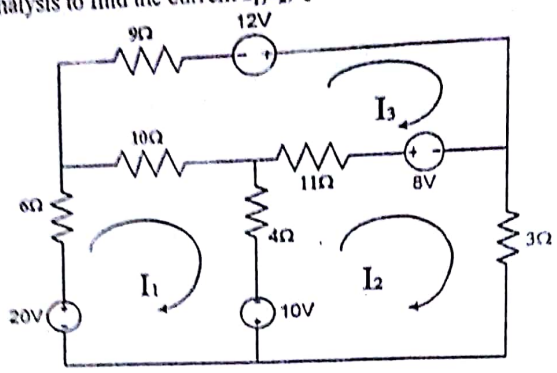


Figure-7(b)

08

(a) Write short note on: 09

i) Kirchhoff's Current Law (KCL)
ii) Superposition theorem
iii) Ohm's law

(b) (i)Find the Thevenin equivalent circuit for the network of Figure: 8(b) where load resistance is R_L 13
(ii)Determine the value of R_L for which maximum power is delivered. Also find the value of maximum power delivered to the load resistance.

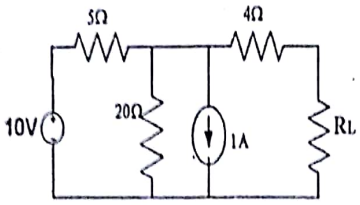


Figure-8(b)

(c) Using superposition theorem, find the current through Iy for the network of Figure: 8(c). 13

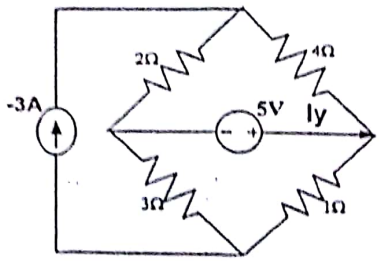
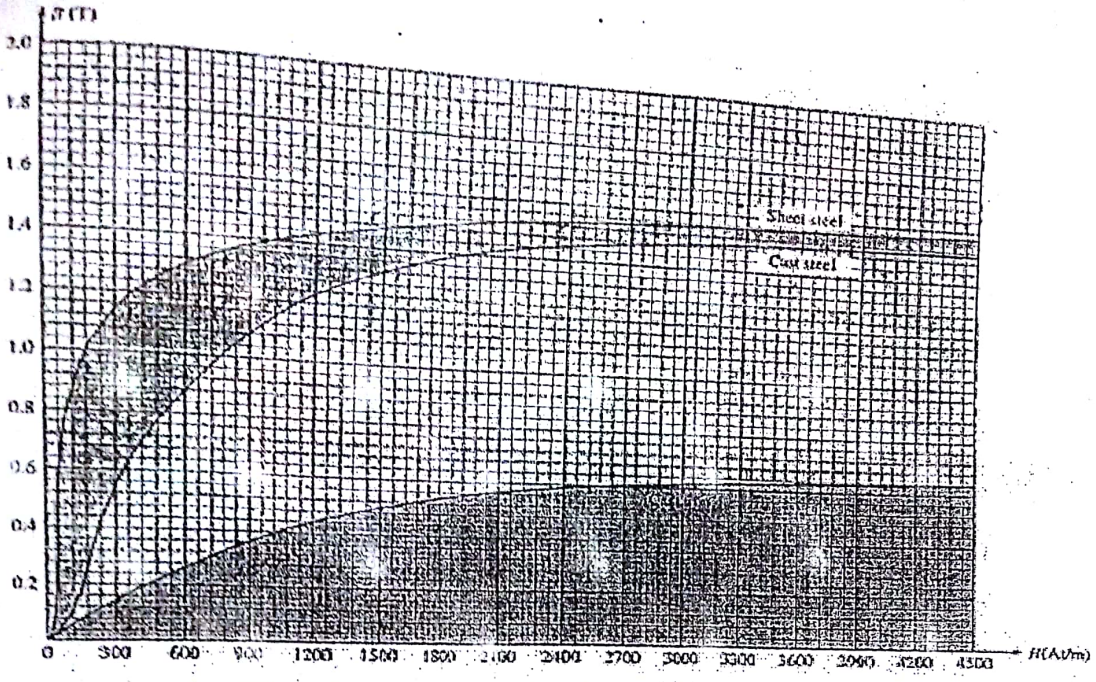
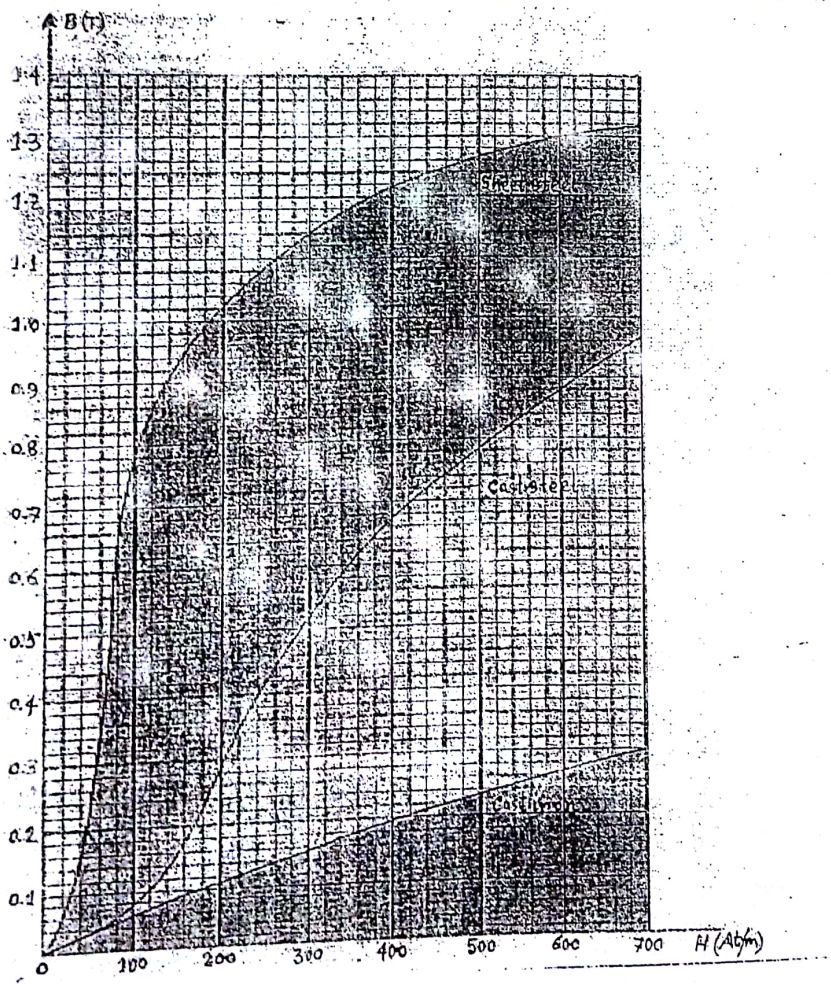


Figure-8(c)





HSANULLAH UNIVERSITY C

Department of Compute

Course N(

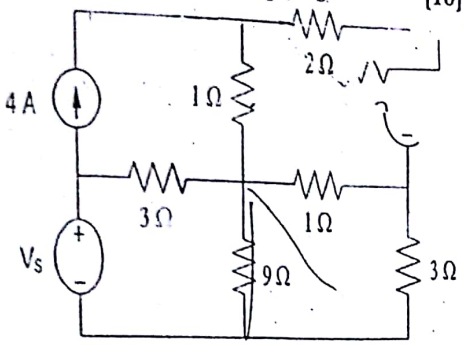
Course Title: Basic

Full Marks: 20

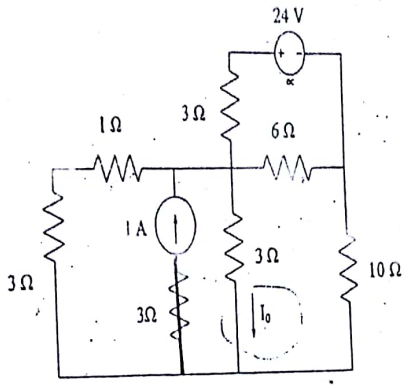
Qu

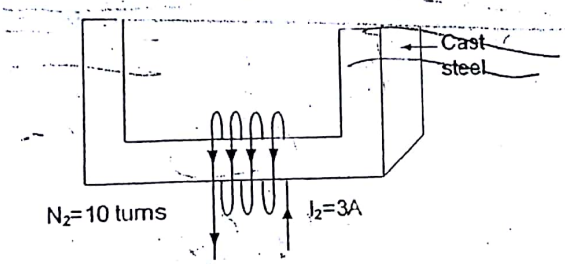
Time:20 min

1. In the network , the 16 Volt source supplies 32 Watt power to the network. Using KVL & KCL, find the Voltage, V_S [10]



2. Find the value of I_o using Source Transformation.





AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NO: EEE-1241 COURSE TITLE: Basic Electrical Engineering

TIME: 20 MIN

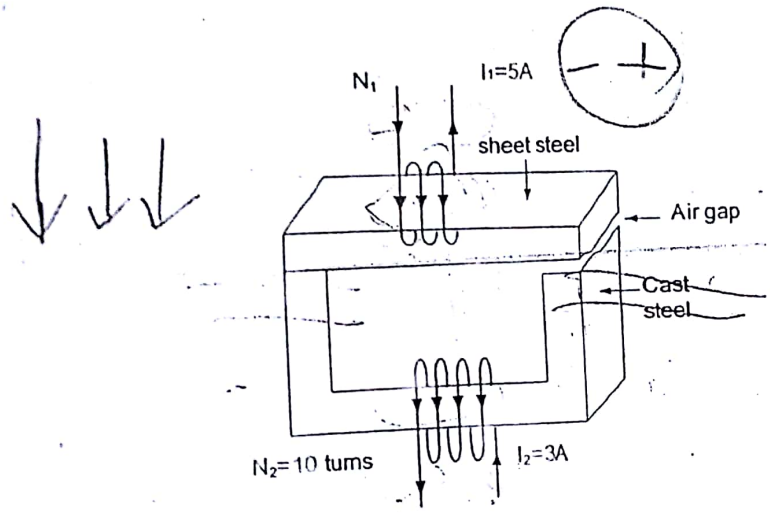
FULL MARKS: 20

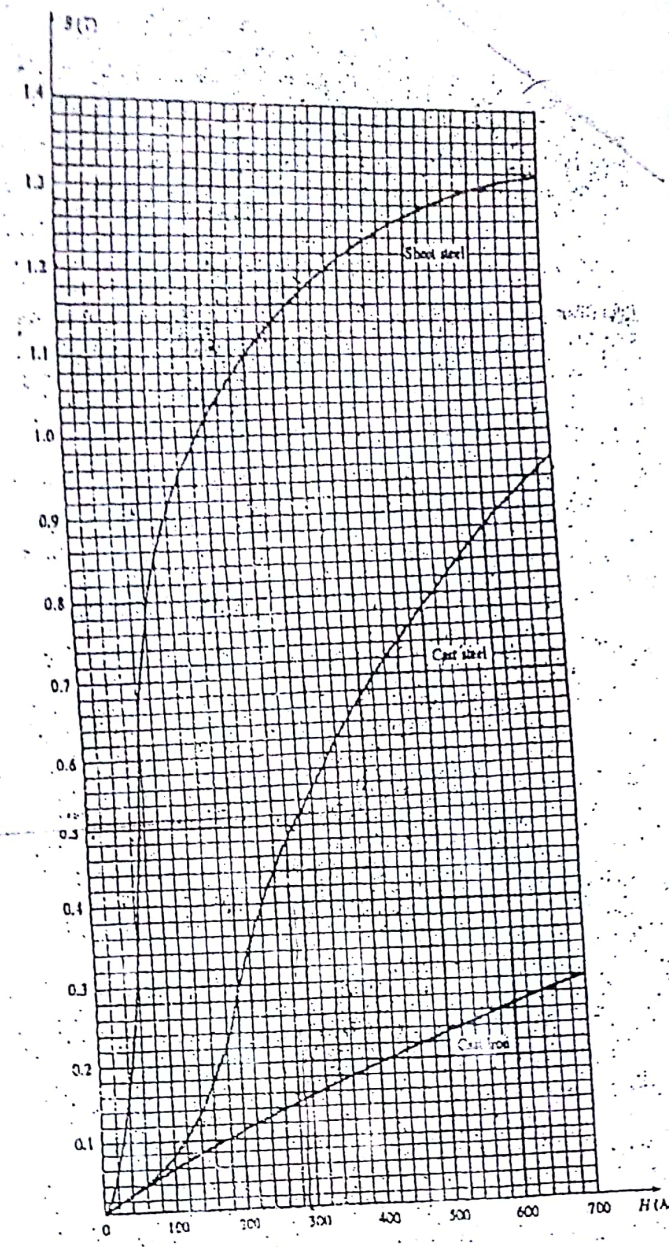
SET:B

1. Write Faraday's Law of electromagnetic induction. [4]

2. Observe the magnetic circuit of Figure: 4(b), where the flux on the core is $\Phi=0.75\times10^{-4}$ wb, current, area A=1.5 cm^2 (throughout) $l_{sheet\ steel}$ =5 cm, $l_{cast\ steel}$=10 cm .$l_{air\ gap}$=0.2 cm. 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. [16]

- Find the number of turns N_1



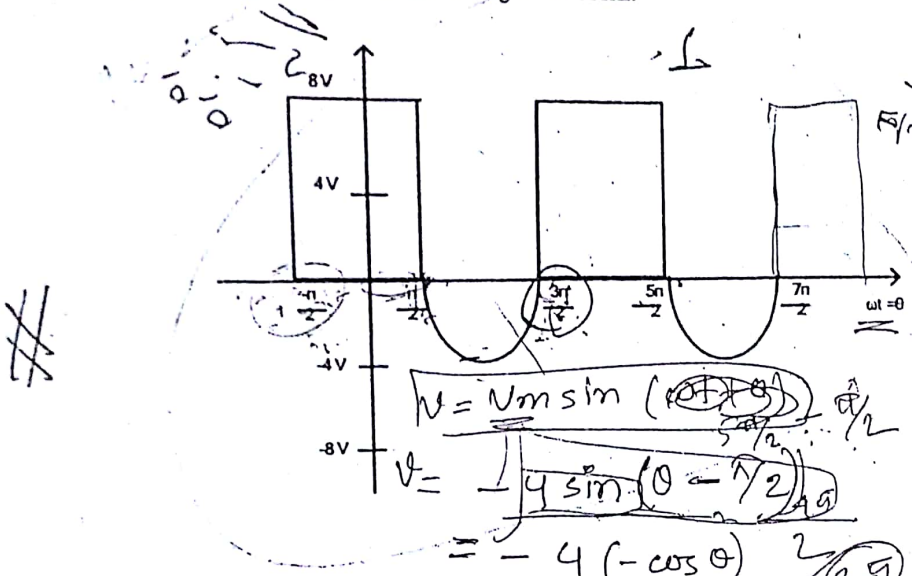


Page 6 of 6

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
1ST YEAR 2ND SEMESTER
COURSE NO: EEE-1241 COURSE TITLE: Basic Electrical Engineering
QUIZ: 4
SET: B

TIME: 30 MIN FULL MARKS: 20

1. Find the average value of the following wave form.



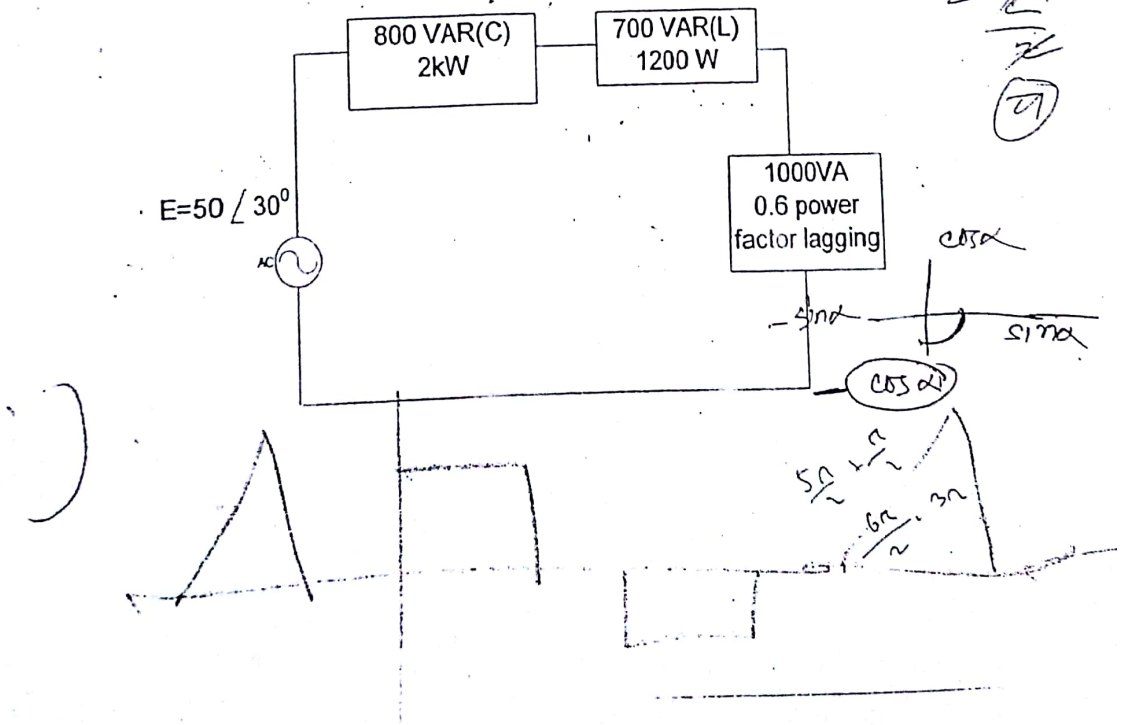
$V = V_m \sin(\theta)$

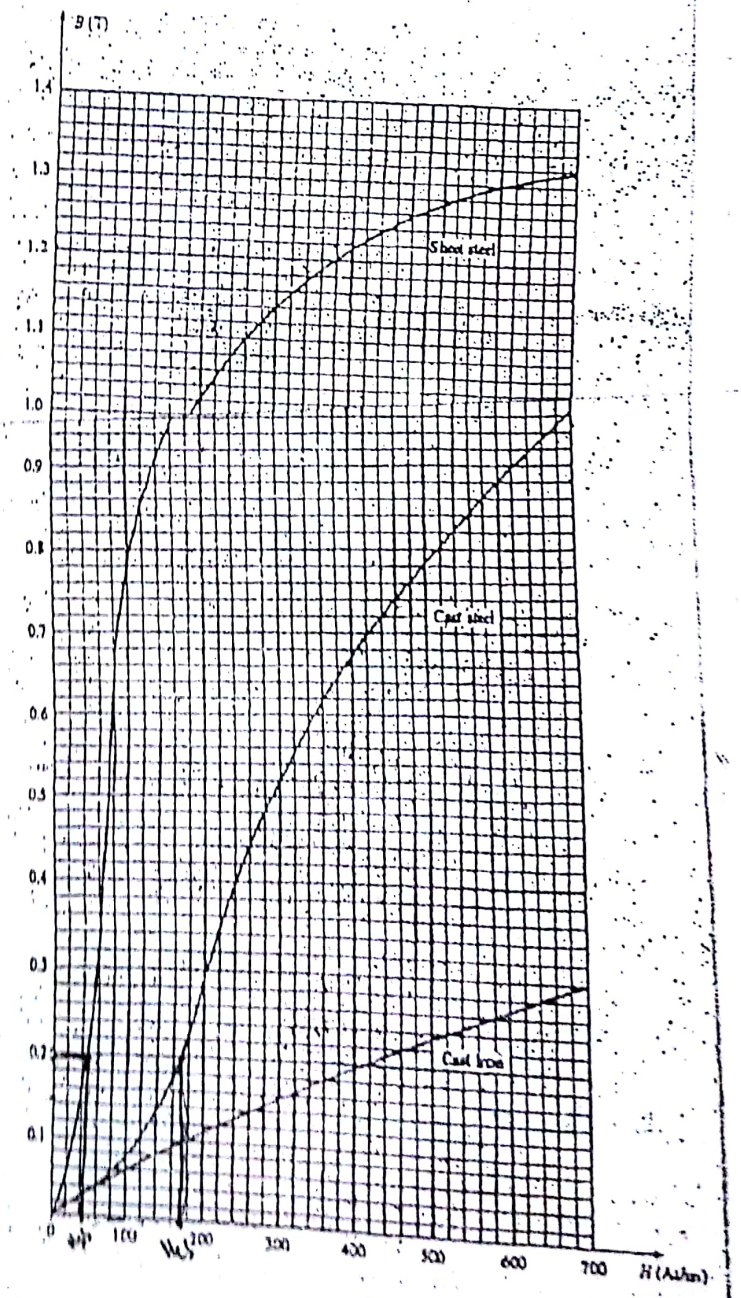
$V = -4 \sin(\theta - \pi/2)$

$= -4(-\cos\theta)$

$= 4\cos\theta$

2. Find the total power factor.





AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NO: EEE-1241 COURSE TITLE: Basic Electrical Engineering

TIME: 20 MIN FULL MARKS: 20

SET: A

1. Compare between electric circuit and magnetic circuit. [4]

2. Observe the magnetic circuit of Figure: 4(b), where the flux on the core is $\Phi=4\times10^{-4}$ wb, current, area A=20 cm^2 (throughout) $l_{sheet\ steel}$=9.5 cm, $l_{cast\ steel}$=7.5 cm .$l_{air\ gap}$=0.2 cm. 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. [16]

- Find the number of turns N_1