

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE

Semester - Fall

Year : 2011
Full Marks : 100
Pass Mark : 45
Time : 3 hrs

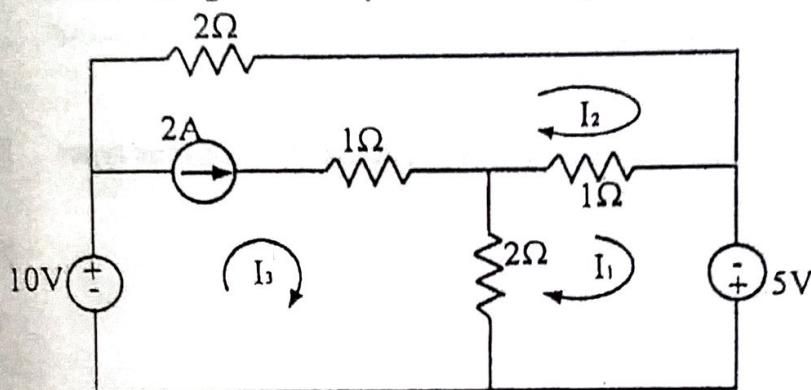
Course: Basic Electrical Engineering

Candidates are required to give their answers in their own words as far as practicable.

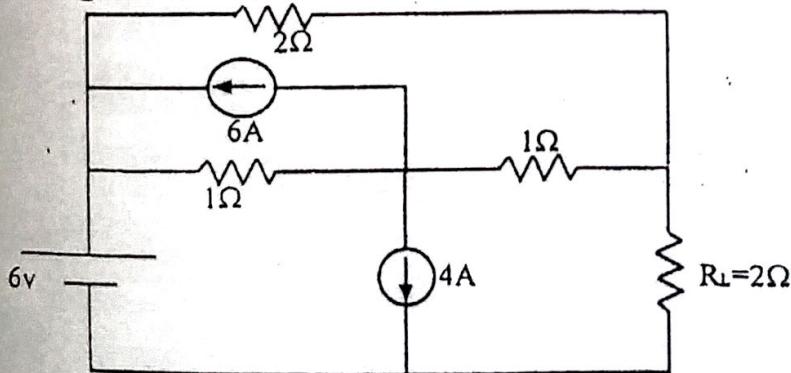
The figures in the margin indicate full marks.

Attempt all the questions.

1. a. Find the mesh current I_1 , I_2 and I_3 in the circuit given below using the concept of mesh analysis. 7

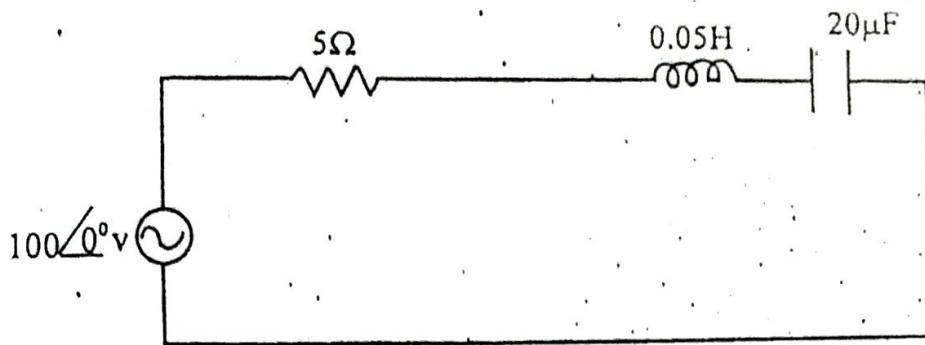


- b. State Superposition theorem and hence use it to determine the current flowing through $R_L = 2 \text{ ohm}$ in the given circuit. 1+7

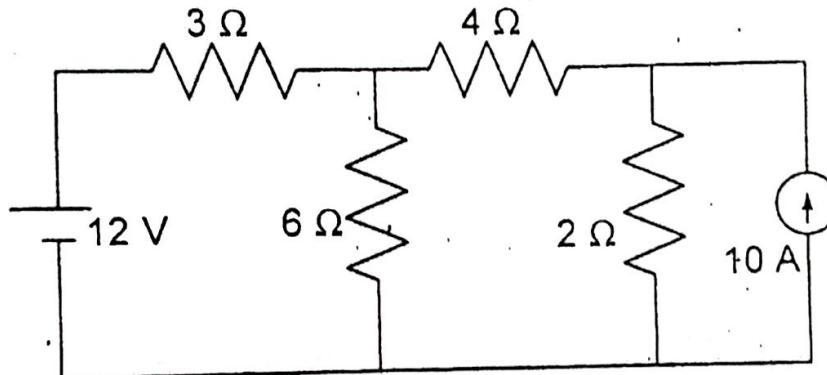


2. a. In the series circuit shown, the applied voltage is 100 V of variable frequency. If the frequency is varied till the resonance occurs in the circuit than find the current, resonant frequency, bandwidth, quality factor and the voltage across the inductors 7

and capacitors.

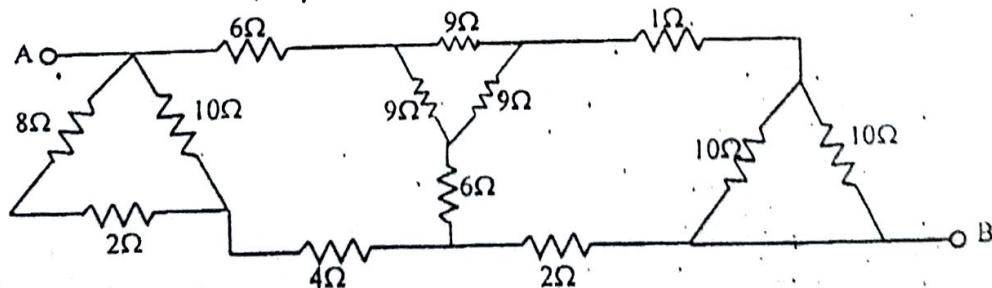


- b. Utilizing Thevenin's theorem, find the current in 4 ohm resistance in the circuit given below. 8



OR

Determine the resistance between the points A and B in the network given below. 8



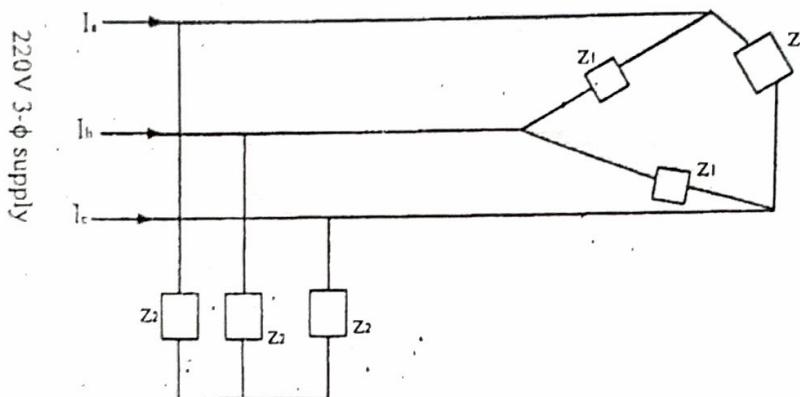
3. a. Determine the average value and form factor of half wave rectified alternating current represented by $i = 20\sin\omega t$. 3+4

OR

Find the root mean square value of the resultant current in
a wire which simultaneously directs a current of $2\sqrt{2}$ A
and sinusoidal current of peak value $2\sqrt{2}$ A. 7

- b. Two three phase loads are connected as shown below to a
three phase, 220V supply where, $Z_1 = (20 + j30)$ ohm
and $Z_2 = (30 + j60)$ ohm. Calculate: 8

- Line currents I_a , I_b , and I_c
- Current in each delta and wye phase and the line
currents drawn by each three phase load and
- total power drawn from supply



4. a. What do you mean by power factor? Explain about the significance of power factor. 5
- b. Explain at least five advantages of three phase system over single phase system. 5
- c. Explain in brief the basic requirements of measuring instruments. 5
5. a. Differentiate briefly any four of the following: 2x4
- Nodal analysis and Mesh analysis
 - Real power and reactive power
 - Absolute instrument and secondary instrument
 - Ideal transformer and practical transformer
 - Motor and generator
 - Application of series dc motor and dc shunt motor
- b. A single phase, 50 KVA, 2200/220 V, 50 Hz, transformer has HV winding resistance of 0.65 ohm and leakage reactance of 0.85 ohm. The corresponding values of LV winding are 0.006 ohm and 0.008 ohm respectively. The shunt branch parameters g_m and b_m 7

determined at rated voltage and frequency, which viewed from LV side are $0.003S$ and $0.021S$. Draw the equivalent circuit referred to LV side and HV side.

6. a. What is a DC machine? Deduce the expression for emf generation in DC machines.

OR

Explain the principle of operation of three phase induction motor.

- b. A 230V dc shunt motor has an armature resistance of $0.1\ \Omega$ and a shunt field resistance of $275\ \Omega$. It runs at speed of 1000 rpm when drawing an armature current of 75A. Calculate the additional resistance to be inserted in the field circuit to raise the motor speed to 1200 rpm at an armature current of 125A. Assume linear magnetization characteristics.

OR

Illustrate the speed-torque characteristics of various types of dc motors. Also explain them briefly. 8

7. Write short notes on any two:

2x8

- Single phase energy meter
- Hysteresis and eddy current loss
- Testing of transformers

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Semester – Spring

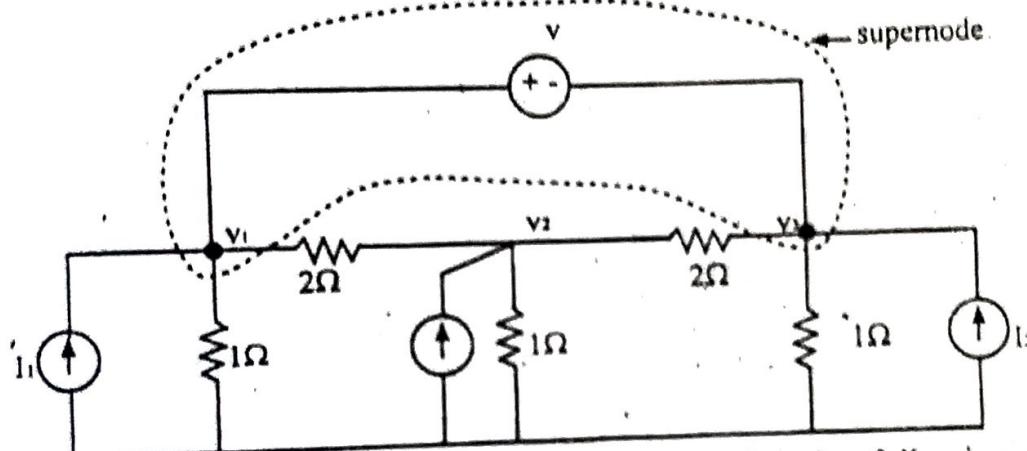
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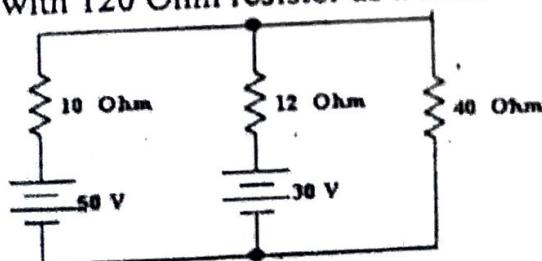
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Attempt all the questions.

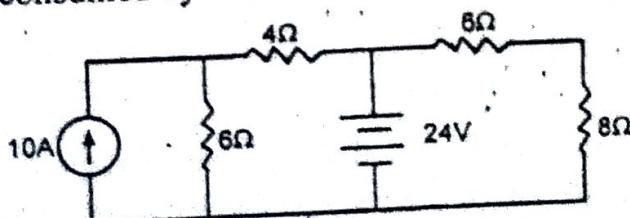
1. a. Obtain the voltage solution of the network with $I_1 = I_3 = 1A$, $I_2 = 2A$ and $V = 0.5V$. 8



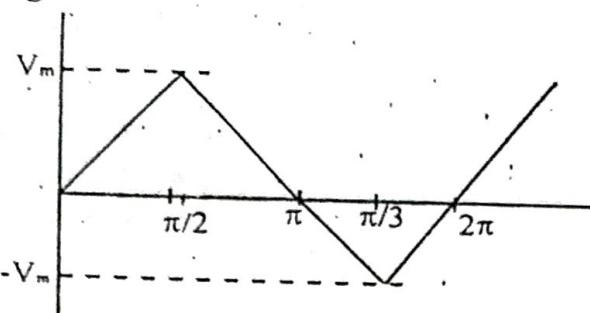
- b. State Thevenin's Theorem and thevenize the following circuit 1+6 with 120 Ohm resistor as a load.



2. a. What do you mean by source transformation? Calculate the power consumed by 8Ω resistor using Superposition theorem. 2+6



- b. Find the average value and rms value of waveform shown in 3+4 figure.



3. a. Three equal impedance each $(80 + j60)\Omega$ are connected in Y(wye) and a balanced three phase 400V supply system is connected across this load. Find (i) the phase current, (ii) line current, (iii) power factor and (iv) total power. 8
- b. A 100V supply with variable frequency is applied to series RLC circuit of $R = 10 \Omega$, $L = 0.01H$, and $C = 100 \mu F$ and tuned until resonance occurs. Find the resonant frequency, bandwidth, Q-factor, and voltage across inductor at resonance condition of the circuit. 7
4. a. Define the term resonance in AC circuit and also differentiate between series resonance and parallel resonance. 5
- b. Compare and contrast star connected and delta connected system. 5
- c. Briefly explain the construction and operation of single phase transformer. 5
5. a. Differentiate briefly any four of the following: 8
- Active and passive elements
 - Admittance and reactance
 - Absolute instrument and secondary instruments
 - Line voltage and phase voltage
 - Magnetic circuits and electric circuits
 - Single phase and three phase induction motor
- b. Explain the construction and operating principle of Permanent Magnet Moving Coil Instrument (PMMC). List out the application areas of the PMMC. 7

OR

Explain the principle of operation of single phase energy meter. 7

6. a. A 220V dc shunt motor draws a current of 40A at full load and 8

shown in 3+4

runs with a speed of 1500 rpm. Calculate the value of resistance required to be inserted in the armature circuit so that the speed drops to 1000 rpm at constant load. Given that: $R_a = 0.03\Omega$ and $R_f = 150\Omega$.

- b. A transformer has a primary winding of 600 turns and secondary windings of 100 turns. When the load current on the secondary is 20A at 0.6 PF lagging, the primary current is 15A at 0.707 PF lagging. Determine the no load current of the transformer. Draw vector diagram.

OR

A 30KVA, 2400/120V, 50Hz transformer has a high voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω . The low voltage winding resistance is 0.35Ω and the leakage reactance is 0.012Ω . Find the equivalent winding resistance, reactance and impedance as referred to both high voltage and low voltage sides.

7. Write short notes on any two:

- a. Dependent sources
- b. Power factor and its significance
- c. Armature reaction in DC machine
- d. Three phase synchronous generator

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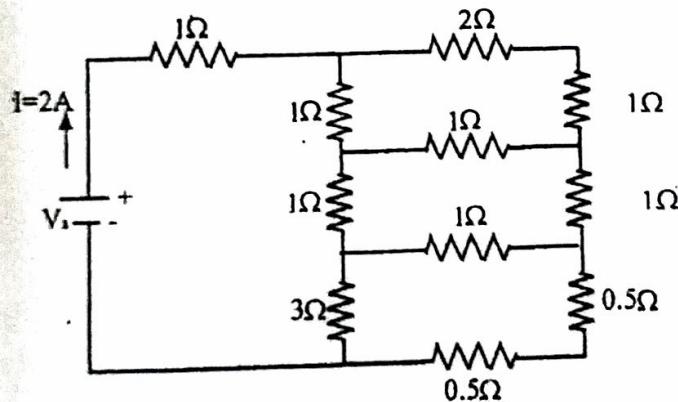
Attempt all the questions.

1. a) Describe in brief the generation, transmission, distribution and consumption of electrical energy by domestic, industrial and commercial consumers. 7

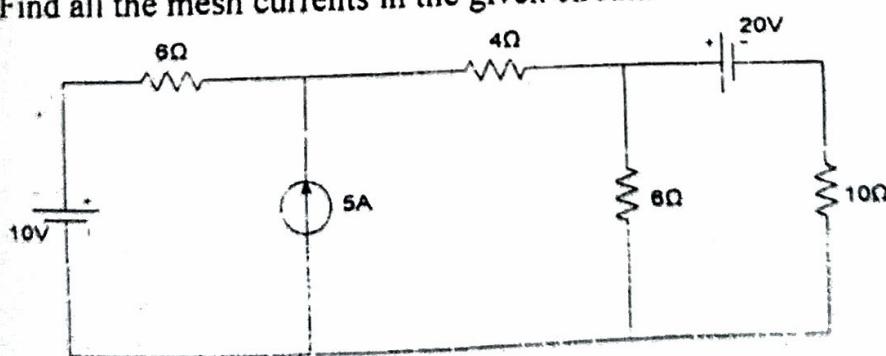
OR

Explain the principle of operation of single phase energy meter.

- b) Find the value of the voltage sources (V_s) that delivers 2 Amps 8 current through the circuit as shown in figure below.



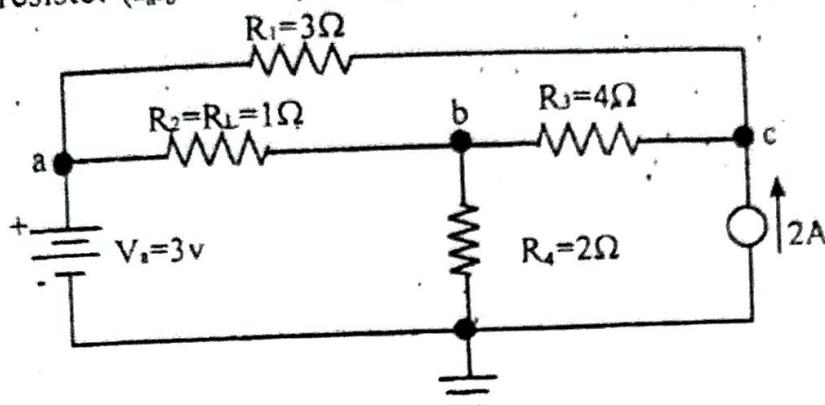
2. a) Find all the mesh currents in the given circuit. 7



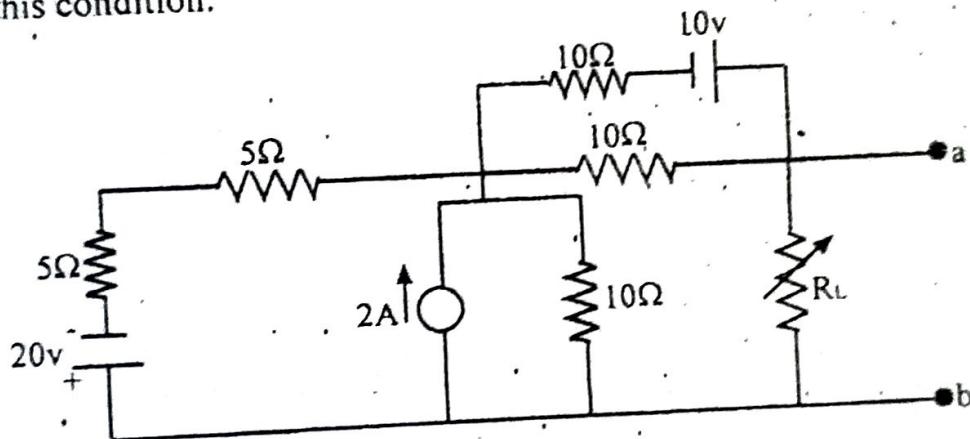
3.

OR

For the circuit shown in figure, find the current through $R_L = R_2 = 1\Omega$ resistor (I_{a-b} branch) using Thevenin's theorem.

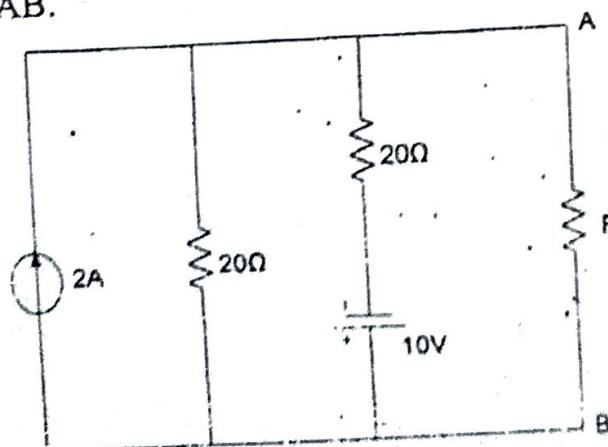


- b) For the circuit shown in figure, find the value of R_L that absorbs maximum power from the circuit and the corresponding power under this condition.



OR

Find Norton's equivalent circuit of the given network as viewed from AB.



3. a) Find the average value, rms value and form factor for a full wave

8

4. a) rectified sinusoidal waveform.
 b) Explain the sinusoidal response of RLC series circuit.
4. a) A coil of inductance 0.08H and negligible resistance is connected in series with a $15\ \Omega$ non-inductive resistance. The combined circuit is energised from a 240 V , 50 Hz supply. Calculate:
- i) Reactance of the coil
 - ii) Current in the circuit
 - iii) Voltage across the coil
 - iv) Power factor of the circuit
 - v) Impedance of the circuit
 - vi) Voltage across the resistance
 - vii) Power absorbed by the circuit
- b) Three similar coils, each having a resistance of $20\ \Omega$ and an inductance of 0.05H are connected in star to a 3-phase, 50 Hz supply with 400V between lines. Calculate the total power absorbed and the line current in each case. Find the magnitude of current flowing in the neutral wire.
5. a) What are the advantages of three-phase over single-phase ac system? Explain the measurement of three phase power by two wattmeter method.
- b) Explain the operation of single phase transformer on NO-LOAD condition. Draw appropriate phasor diagram.
- OR**
- A 5KVA , $250/500\text{ V}$ transformer gave the following test results:
- O.C. test: 20V ; 12A ; 100W : with secondary open circuited
- S.C. test: 250V ; 1A ; 80W : with primary short circuited
- Draw equivalent circuit of transformer referred to primary with respective circuit constants.
6. a) Explain how electrical energy is converted to mechanical rotation in DC motor.
- b) Explain the principle of operation of three phase induction motor.
- OR**
- List down the uses of induction motor and synchronous motors.
7. Write short notes on any two:
- a) Power factor and its significance
 - b) Speed control of dc motor
 - c) Basic requirements of measuring instruments
 - d) Color coding of resistor

7

8

3+5

7

7

7

8

7

7

 2×5

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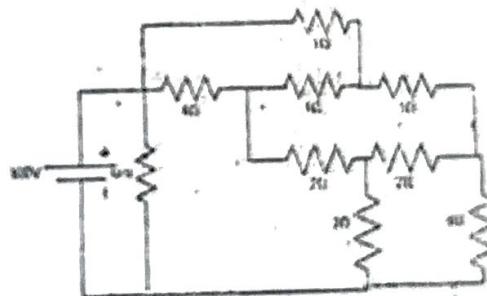
Attempt all the questions.

1. a) Explain in brief about generation, transmission and distribution of electrical power.

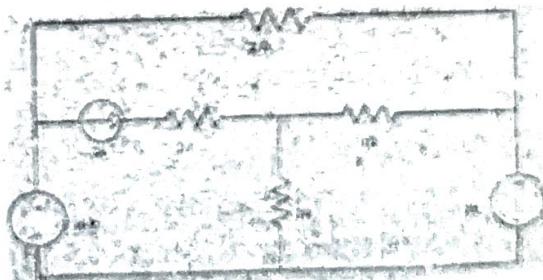
OR

Explain the construction and operation of single phase energy meter.

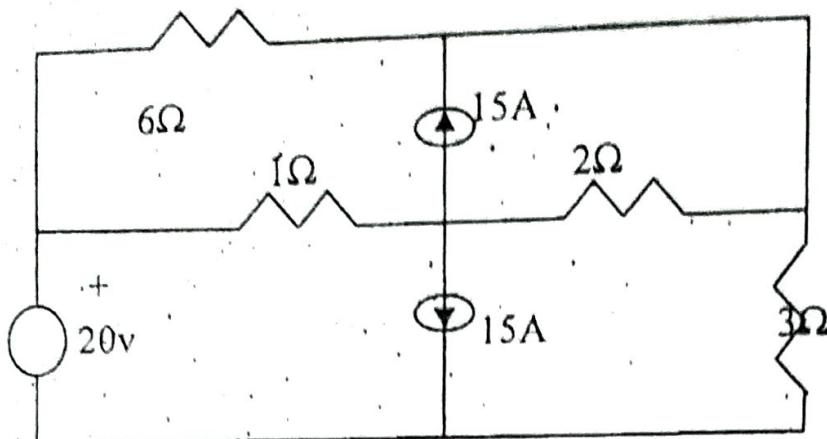
- b) Define active and passive elements. Find the equivalent resistance of the given network seen from the source.



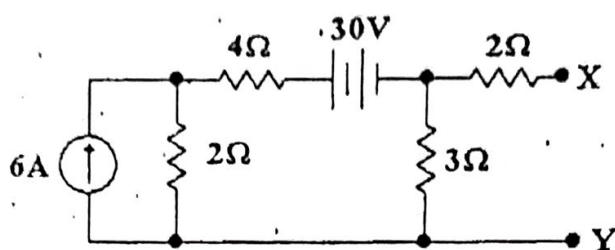
2. a) By using Supermesh concept calculate voltage across 2Ω resistor of the circuit shown below.



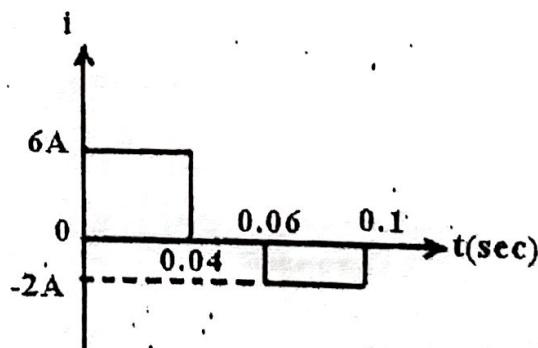
- b) State Thevenin's theorem and use it to calculate power consumed by 3Ω resistor for the circuit shown below.



3. a) State and explain Norton's theorem. Find the Norton's equivalent for the network to the left of terminals X-Y in the figure shown below. 7



- b) A varying current with a periodic waveform as shown in figure below flows through an 8Ω resistor. Determine the 8
- average value
 - rms value
 - heat dissipated in 5 minute.



4. a) A series R-L-C circuit has 10Ω resistance, $0.01H$ inductance, and $100\mu F$ capacitor. A $100V$ supply with variable frequency is applied to this circuit and tuned until resonance occurs. Find the resonant frequency, bandwidth, and quality factor, current drawn by the circuit, and voltage across inductor at resonance condition. 8
- b) Explain how three phase power is measured using two wattmeters. 7
5. a) Three equal impedances having resistance 8Ω and inductive resistance 6Ω are connected in delta and connected to $230V$, 3 phase. 8

CON

Calculate

- i. Resistance of coil
- ii. Inductance of coil

OR

The star-connected stator of a three-phase, 50Hz alternator supplies a balanced delta-connected load. Each phase of the load consists of a coil of resistance 15 ohm and inductance 36mH, and the phase voltage generated by the alternator is 231V. Calculate a) the phase and line currents b) the load power factor c) the power delivered to the load.

- maximum
- rough 10Ω 8
- stage wave
- inductive frequency LC series connected power of supply. 7
- 7
- 8
- 7
- 7
- 2x
- b) A 240v shunt motor runs at 1450 rpm at full load with an armature current of 11 A. The total resistance of armature and brush is 0.6Ω . If the speed to be reduced to 1000rpm with the same armature current, calculate the value of resistance to be connected in series with the armature.
 6. a) A 50KVA, 500/250V transformer has a primary winding resistance of 0.5Ω and leakage reactance of 0.7Ω . The secondary winding resistance is 0.8Ω and leakage reactance of 0.9Ω . Calculate the equivalent resistance, reactance and impedance of transformer referred to
 - i. Primary
 - ii. Secondary
 - b) Explain the construction and operating principle of 3ϕ induction motor.
- OR
7. \ Explain the construction and operation of synchronous motor.
 7. Write short notes on: (Any two)
 - a) Advantages of 3ϕ system
 - b) Magnetic circuit analogy with electric circuit.
 - c) Power factor and its significance.

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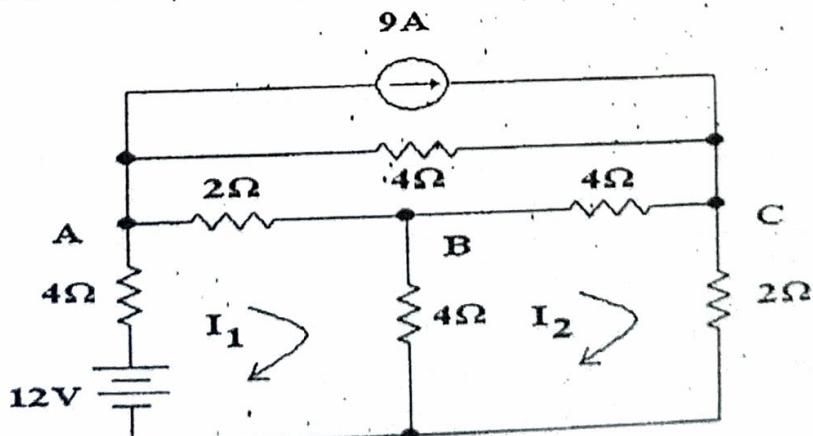
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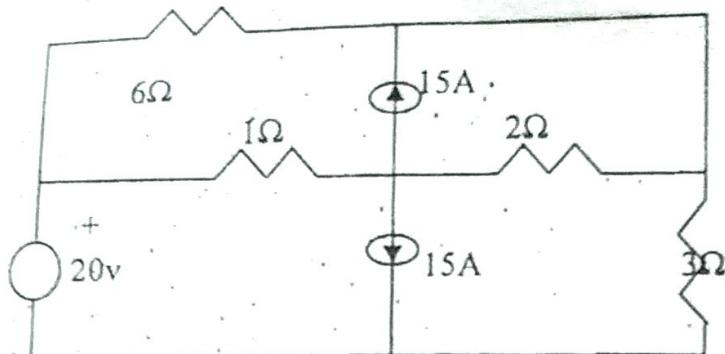
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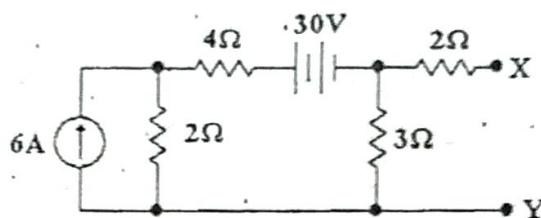
1. a) Draw a typical single line diagram for the transmission and distribution of three phase power and explain why transformer is needed to transfer power over long distance? 7
- b) A resistance wire 10 m long and cross sectional area 10 mm^2 at 0°C passes a current of 10 A when connected to dc supply of 200 volts. Calculate:
 - i. Resistivity of the material
 - ii. Current which will flow through the wire when the temperature rises to 50°C . given $\alpha_0 = 0.0003$ per degree centigrade.8
2. a) Use nodal analysis to determine the voltage across BC and the current in the 12-V as shown in figure below. 8



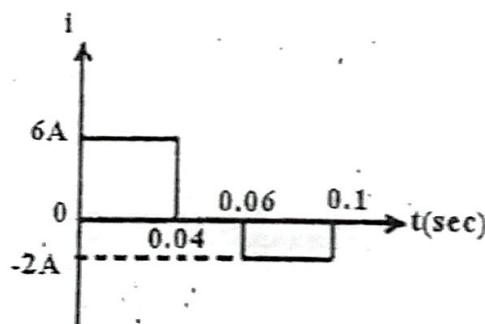
- b) Use superposition theorem to calculate the current through 3Ω of the ckt shown in fig below. 7



3. a) State and explain Norton's theorem. Find the Norton's equivalent for the network to the left of terminals X-Y in the figure shown below. 7



- b) A varying current with a periodic waveform as shown in figure below flows through an 8Ω resistor. Determine the 8
- average value
 - rms value
 - heat dissipated in 5 minute.



4. a) A series R-L-C circuit has 10Ω resistance, $0.01H$ inductance, and $100\mu F$ capacitor. A $100V$ supply with variable frequency is applied to this circuit and tuned until resonance occurs. Find the resonant frequency, bandwidth, and quality factor, current drawn by the circuit, and voltage across inductor at resonance condition. 8
- b) Explain how three phase power is measured using two wattmeters. 7
5. a) Three equal impedances having resistance 8Ω and inductive resistance 6Ω are connected in delta and connected to $230V$, 3 phase 8

wire $3\phi Y$ (wye connected) source. Then calculate

- i. Phase and line current of load
- ii. Power factor
- iii. Power consumed

b) A 25KVA, 400/200V, 1ϕ transformer has high voltage winding resistance and reactance are 0.2Ω and 0.5Ω respectively. The values of low voltage are 0.6Ω and 0.8Ω respectively. Calculate the equivalent resistance, reactance and impedance referred to

- i. LV side
- ii. HV side.

7. 6. a) Explain operating principle of 3ϕ Induction motor.

b) A 220v dc shunt motor runs with 1000 rpm with an armature current of 40A. The resistance of armature is 0.5Ω . Calculate the value of resistance to be connected in series so that the speed drops to 600rpm.

8. 7. Write short notes on: (*Any Two*)

- a) Ideal and practical sources.
- b) Power factor and its significance.
- c) Losses in rotating machines.

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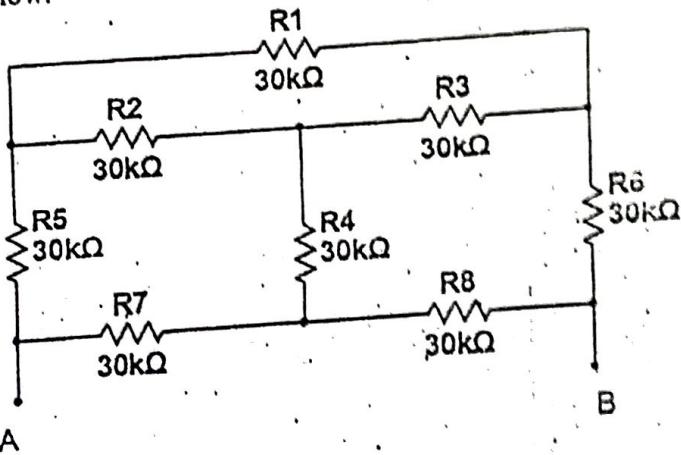
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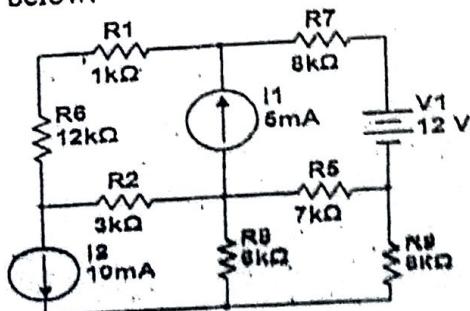
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Attempt all the questions.

1. a) Find the equivalent resistance across the terminals A-B for the circuit shown in figure below. 3

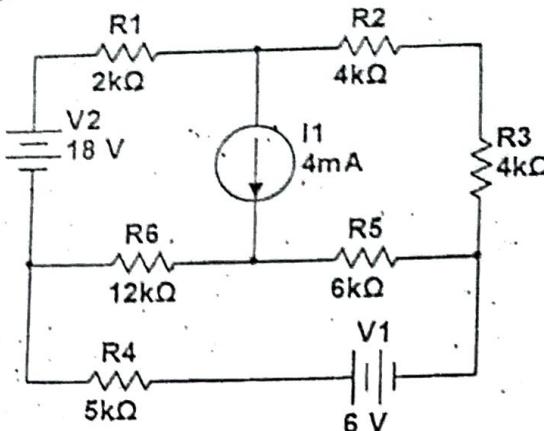


- b) State and explain maximum power transfer theorem with necessary derivation. 7
2. a) Determine the voltage across 3KOhm resistor using mesh analysis for the circuit shown below. 8

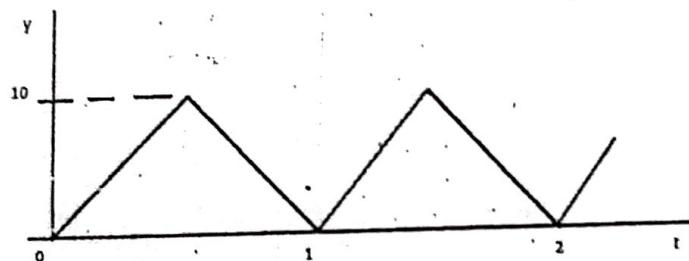


- b) Find the voltage across $6\text{ k}\Omega$ resistor using Norton's theorem.

7



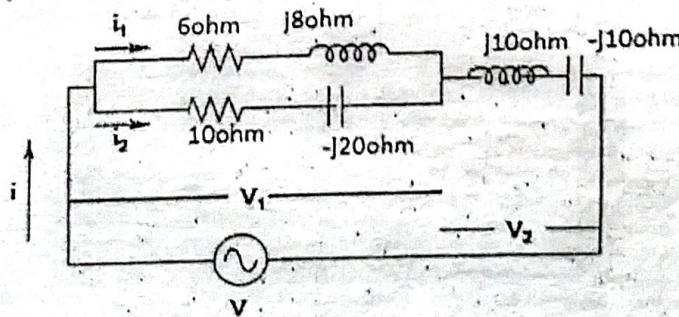
3. a) Find the average value, rms value and form factor of the given triangular waveform?



- b) In the circuit given below, total current $i = (20+j0)$

8

- Calculate branch current i_1 and i_2 .
- Voltage V_1 and V_2 .
- Power factor of entire circuit
- Active and Reactive power in the entire circuit.



4. a) In an R-L-C series circuit, current supplied by the single phase ac

7

source is $15<-38^\circ$ Ampere. Determine the value of all three kind of power if $R=100$ ohm, $X_L=35$ Ohm and $X_C=25$ Ohm. If inductance is 8 Henry, find the resonant frequency.

- b) A three-phase balanced star connected load with $6+j8$ Ohm per phase is supplied by 440 V, 3-phase source. Find the line and phase currents, and the total power dissipated in the load. Derive the relationship between line and phase voltage in three phase balanced star connection.
5. a) Explain with a neat diagram the two wattmeter method for the measurement of three phase power and determine watt meter reading when it is connected to resistive load
- b) A 10KVA 200/1000 V, 50 Hz, single-phase transformer gave the following test results:
O.C. test(L.V. Side): 200 V, 2.4 A, 100W
S.C. test(H.V. Side): 50 V, 10A, 150W
- Calculate the parameters of the equivalent circuit referred to L.V. Side.
 - Calculate efficiency for $\frac{1}{2}$ rated 0.8 P.f. lagging, & load current for which it gives maximum efficiency
6. a) A 220V dc shunt motor runs at 500rpm when armature current is 50A. Calculate the speed if the torque is doubled. Given that armature resistance is 0.2 ohm and flux remain constant.
- b) Explain the working principle of induction motor with neat diagram.
7. Write short notes on: (Any two)
- Ideal voltage & current source
 - Quality factor of RLC series CKT.
 - Power factor and its significance

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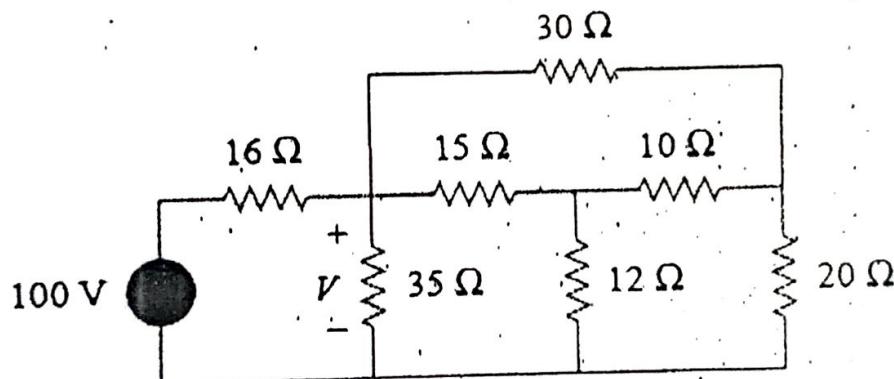
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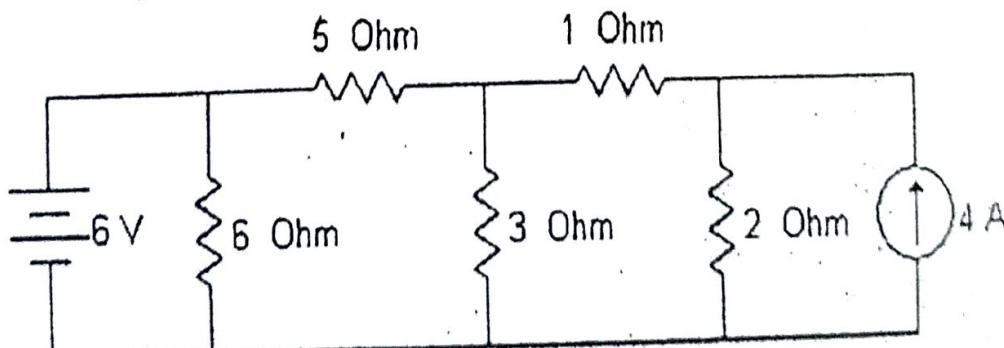
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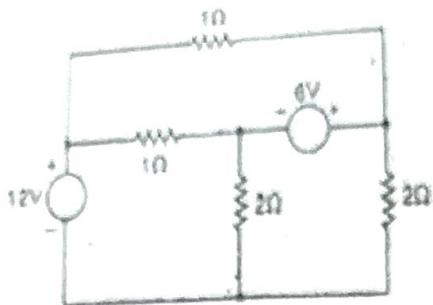
1. a) Obtain the equivalent resistance and use it to find source current for the circuit shown below. Also find V. 7



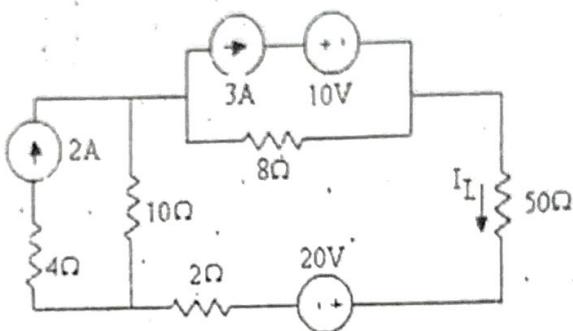
- b) Applying Superposition theorem, calculate the current in 5Ω resistor of circuit given below. 8



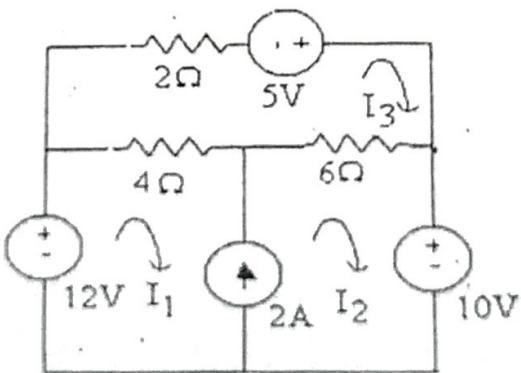
2. a) Calculate the power absorbed/ delivered by 6V source for the network shown in Fig. using nodal analysis. 7



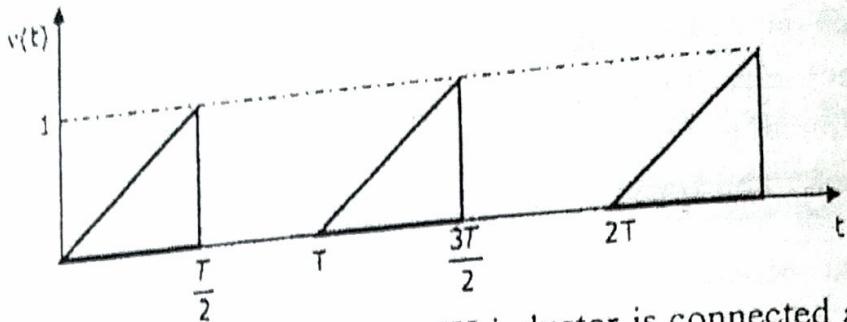
- b) For the circuit shown in Fig. compute the load current using Thevenin theorem and determine the value of the load for which power transfer is maximum.



- a) Solve the circuit in Fig. use mesh analysis to determine the mesh current I_1 , I_2 and I_3 and evaluate the power developed in 10V source.



- b) Find the Average Voltage and rms Voltage of the waveform shown in Fig.



4. a) A 2Ω resistor in series with a $6H$ inductor is connected across a $220V$, 50 Hz. Source. Determine
- The impedance.
 - Input current.
 - The voltage across the resistor and inductor.
 - Power factor.
 - Power input to the circuit.
- b) A balanced star connected load of $(2 + j8)\Omega$ per phase is connected to a $3-\Phi$, 220 V, 50 Hz supply. Find the line current, power factor, power, volt-amperes and reactive power. Draw the phasor diagram showing the line voltage, phase voltage and phase currents.
5. a) Mention the condition for maximum efficiency, and state the different losses in case of a transformer.
- b) The test data were obtained for 20 KVA, 50 Hz, $2000/200$ V distribution single phase transformer. Calculate the approximate equivalent circuit parameter refer to both H.V. and L.V. side.

Test	Voltage (V)	Current (A)	Power (Watt)
OCC with HV open Circuited	200	4	120
SC with L.V. Short circuited	60	10	300

- Also determine efficiency for half load of 0.8 lagging Power Factor.
6. a) Explain the working principle of three phase induction machine.
- b) For a DC separately excited motor, when the field circuit is connected to rated supply, and rated voltage is supplied to armature terminal, motor runs at 1000 rpm at no load. Then estimate the approximate speed of motor if the armature voltage is reduced to 50% of rated value.

Write short notes on: (Any two)

- a) Role of electricity in modern society.
- b) Losses in transformer.
- c) Quality Factor and Band Width.

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Basic Electrical Engineering

Semester: Fall

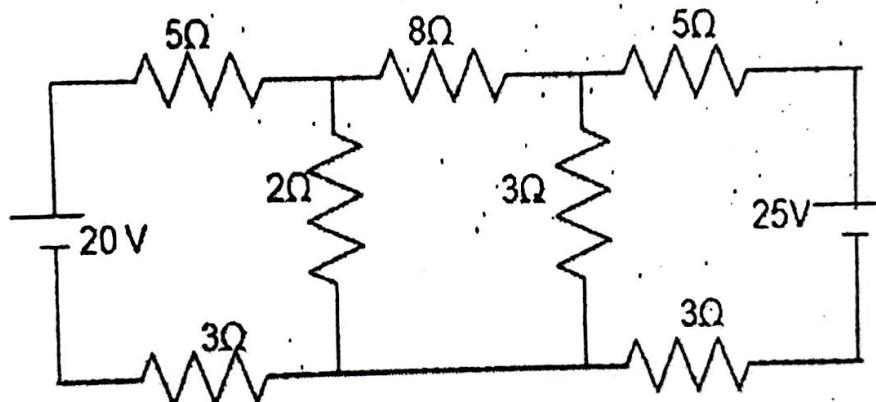
Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

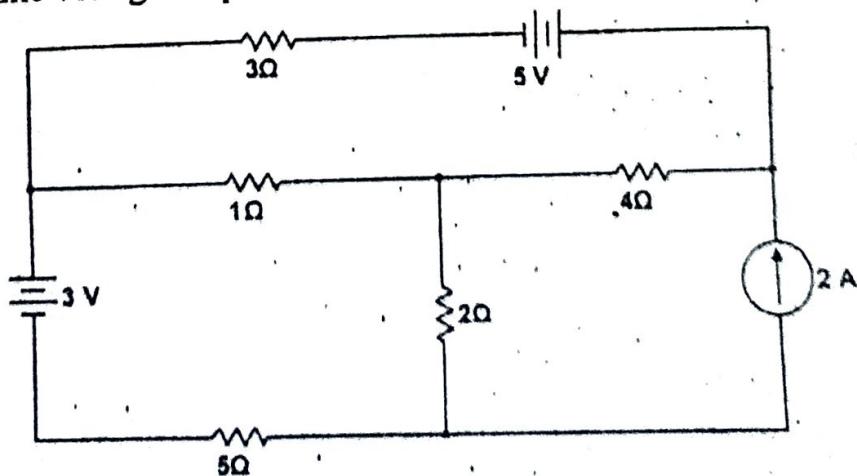
The figures in the margin indicate full marks.

Attempt all the questions.

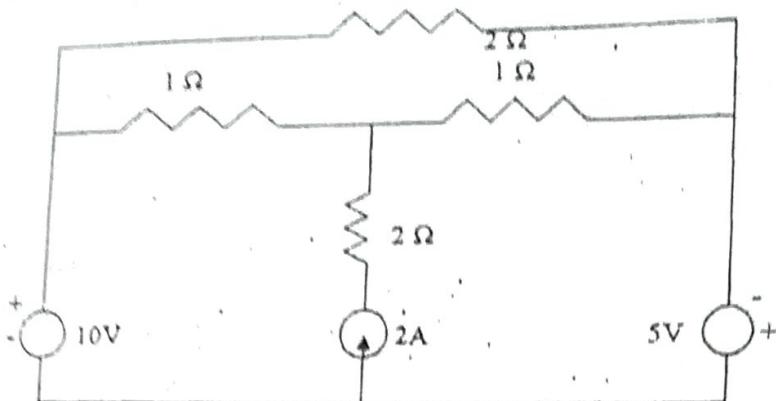
1. a) Explain generation, transmission and distribution with types with the help of single line diagram. 7
b) Find the current across 8Ω resistor using nodal analysis. 8



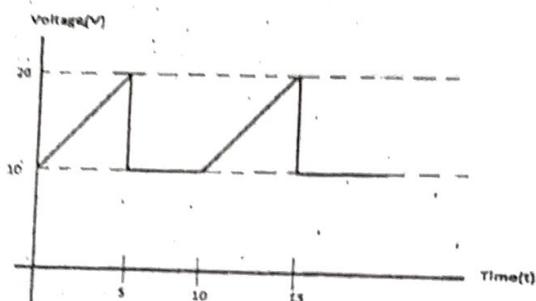
2. a) For the circuit shown in figure, implement Norton's theorem to determine voltage drop across 1Ω resistor. 8



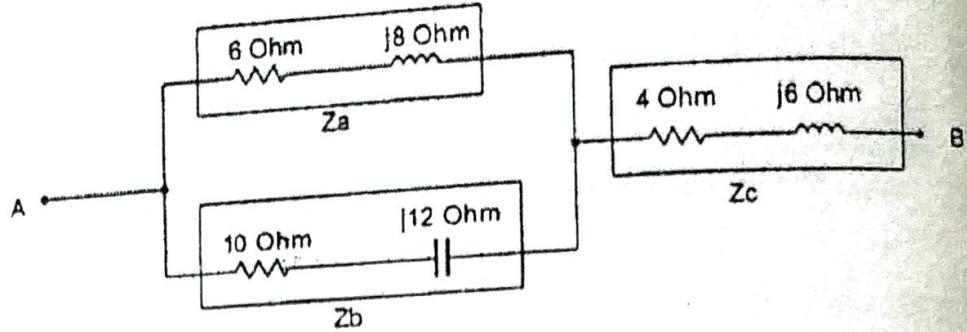
- b) Use Supermesh concept to calculate the mesh currents of the circuit
show below.



3. a) Find average value, rms value, and form factor of given waveform.



- b) Two impedances $(60+j15)\Omega$ and $(30-j10)\Omega$ are connected in series across a 220V, 50Hz supply. Find current, active power, reactive power, apparent power and power factor of the circuit.
4. a) In a series parallel circuit two impedances in parallel are connected with series impedance as shown in figure below. The voltage across impedance Z_c is $(200+j0)V$. Calculate:
- Each branch currents, both magnitude and phase.
 - Supply voltage across AB, and power factor of whole circuit.
 - Active and reactive power of entire circuit.
 - Draw phasor diagram.



- 7
- b) Explain the measurement of three phase power by two wattmeter method with necessary derivations and phasor.
5. a) Three equal impedances having resistance 20Ω and inductive resistance 15Ω are connected in delta connected system. Find:
- Phase and line current.
 - Power factor.
 - Power consumed.
- b) A single phase 10KVA , $200/400\text{ V}$, 50Hz , transformer gave the following test results:
 O.C test : $200\text{V}, 1.3\text{A}, 120\text{W}$
 S.C test : $22\text{V}, 30\text{A}, 200\text{W}$
 Find the parameters of equivalent circuit as referred to HV side and LV side.
6. a) Explain working principle inductive motor with neat diagram.
 b) A 220v dc shunt motor runs with 1200rpm with an armature current of 50A . The value of armature resistance is 0.2Ω . Calculate the value of resistance to be connected in series with the armature so that the speed drops to 1000rpm .
7. Write short notes on: (Any two)
- MPT Theorem.
 - Star/Delta transformation.
 - Speed control of dc motor.

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2016

Programme: BE

Full Marks: 100

Course: Basic Electrical Engineering

Pass Marks: 45

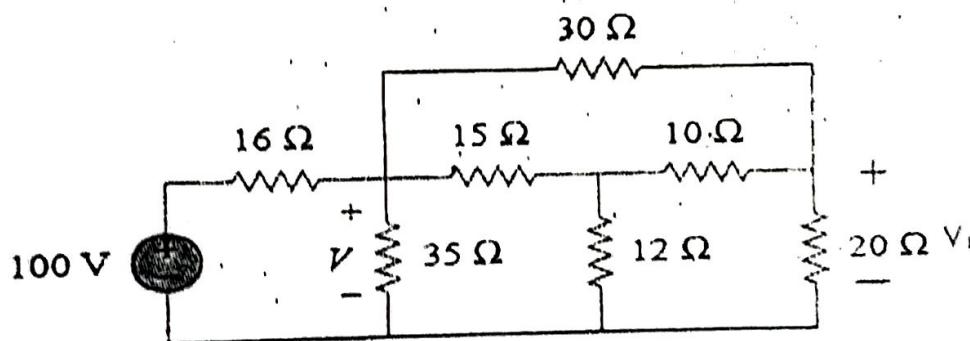
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

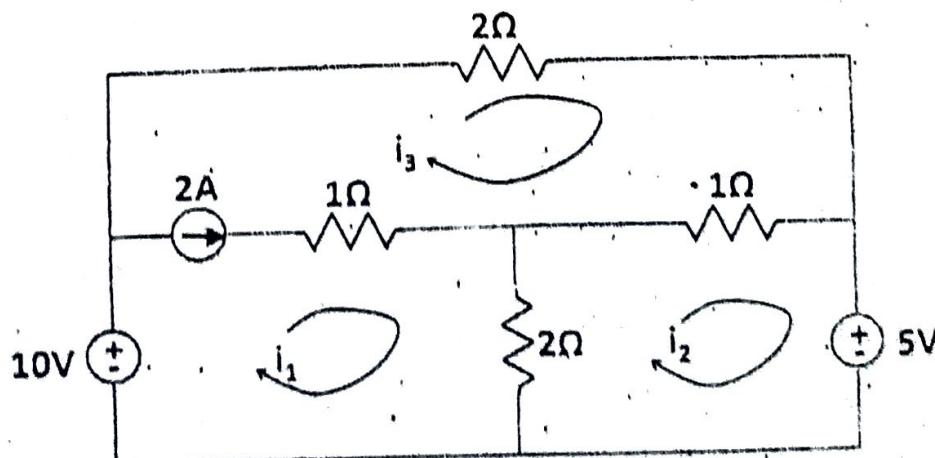
The figures in the margin indicate full marks.

Attempt all the questions.

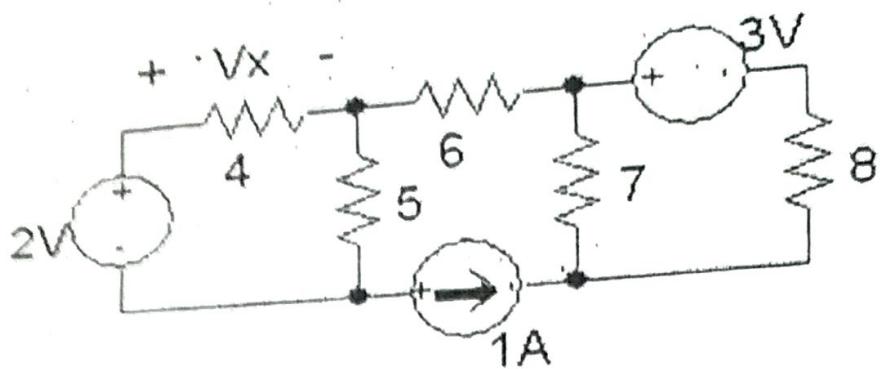
1. a) Obtain the equivalent resistance seen from source terminal and find V_1 . 7



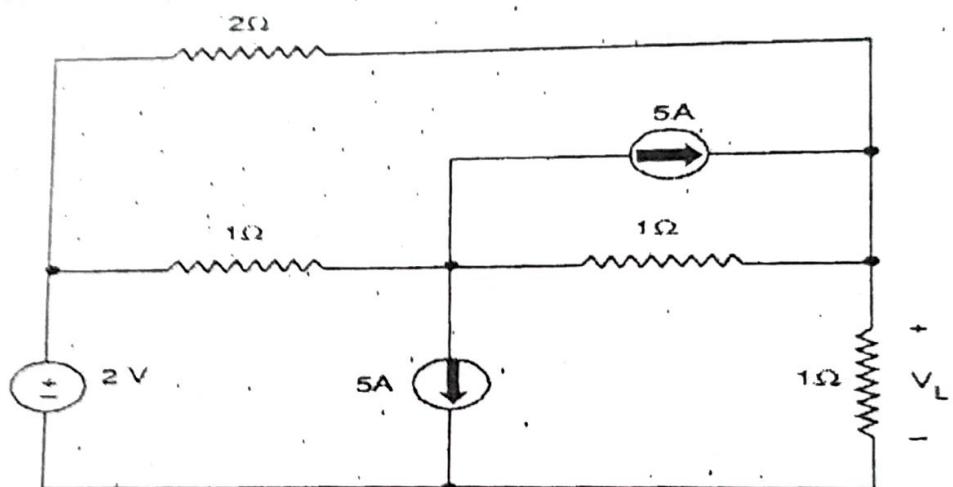
- b) Define active and passive elements. Calculate the power absorbed or delivered by 2A current source using super mesh analysis. 8



2. a) State Superposition theorem and use it to calculate V_x for the circuit shown below (All resistors are in Ohm). 7



- b) State Thevenin theorem and calculate V_L for the below ckt using Thevenin theorem.



8

3. a) A series circuit consists of a non-inductive resistance of 5Ω , and inductive reactance of 10Ω . When connected to a single-phase A.C. supply, it draws a current: $i(t) = 27.89 \sin(628.3t - 45^\circ)$ A.

7

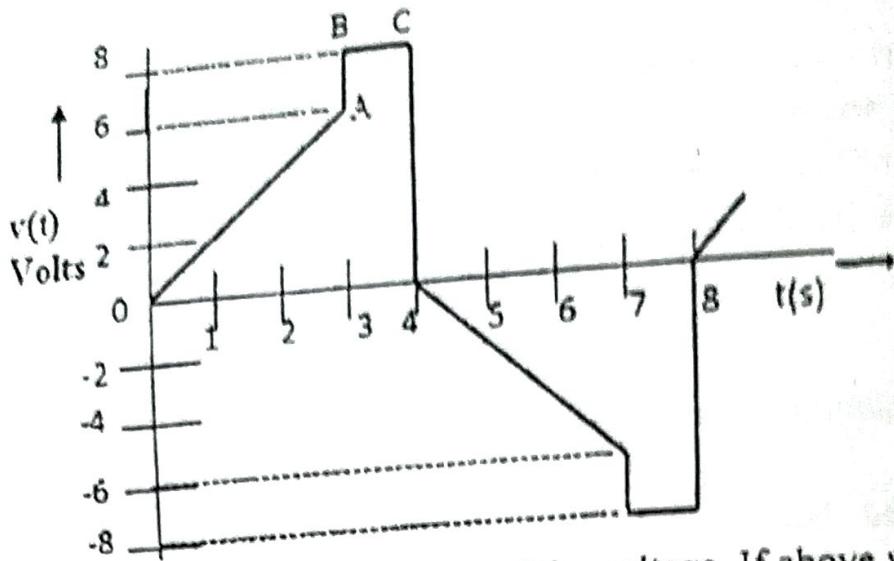
Find:

- the voltage applied to the series circuit in the form: $v(t) = V_m \sin(\omega t + 0^\circ)$

- the inductance (iii) Power drawn by the circuit.

- b) A voltage wave has the variations as shown below:

8



Find the average, and effective values of the voltage. If above voltage is applied to a 50Ω resistor, calculate power dissipated in watts.

4. a) Explain the measurement of 3ϕ power by two wattmeter method with phasor diagram.
- b) Three similar coils having resistance of 10Ω and inductance of $0.25H$ are connected in star to 3ϕ $400V$, $50Hz$ supply. Calculate:
 - i. Line and phase currents
 - ii. P_f
 - iii. Power consumed

5. a) Define transformer and derive the expression for emf induced in transformer.
- b) A single phase, $25KVA$, $250/500V$ transformer has following results on tests:

Open circuit test	$250V$	$1A$	$80W$
Short circuit	$25V$	$10A$	$100W$

Obtain the parameters of the transformer referred to both LV and HV sides.

6. a) A $240V$ shunt motor runs at 1450 rpm at full load with an armature current of $11A$. The total resistance of armature and brush is 0.6Ω . If the speed to be reduced to 1000 rpm with the same armature current, calculate the value of resistance to be connected in series with the armature.
- b) Explain the construction and operating principle of 3ϕ induction motor.

7. Write short notes on: (Any two) 2×5
- a) Ideal and practical sources
 - b) Quality factor and bond width
 - c) Power factor and its significance.

POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2016

Programme: BE

Full Marks: 100

Course: Basic Electrical Engineering

Pass Marks: 45

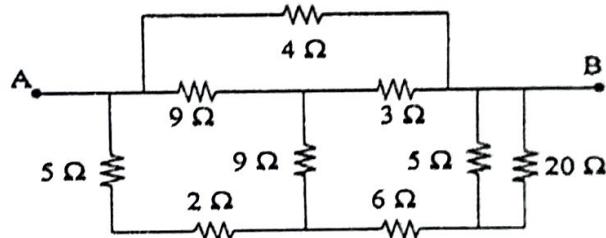
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

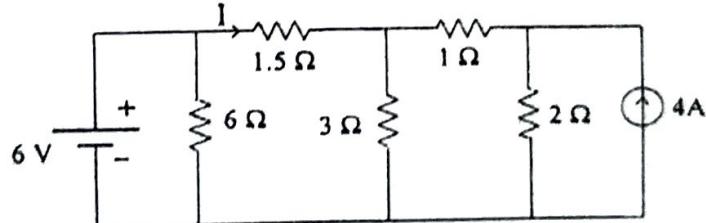
The figures in the margin indicate full marks.

Attempt all the questions.

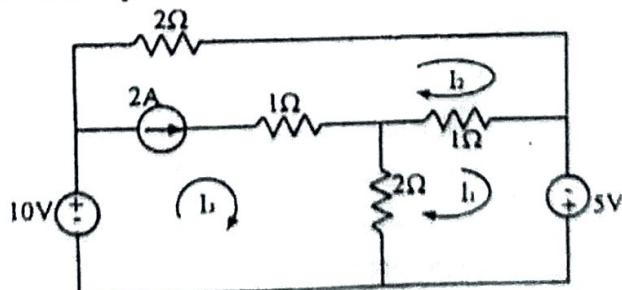
1. a) Explain the importance of electricity in real life. How the life would be in the absence of electricity? 5
- b) Illustrate about voltage divider and current divider circuit. 5
- c) Find the equivalent resistance R_{AB} for the network given below. 5



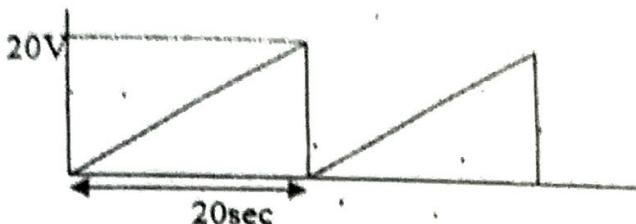
2. a) Find the current I using superposition theorem. 8



- b) Find the mesh current I_1 , I_2 and I_3 in the circuit given below using the concept of mesh analysis. 7



3. a) Find the average value, RMS value and form factor for a wave given below.



OR

Find the average value, effective (RMS) value, form factor and amplitude (peak) factor of the sinusoidal waveform.

4. a) Explain how three phase AC voltage is generated. Differentiate between single phase and three phase system. 8

b) Two impedances $(20+j5)$ Ω and $(30+j8)$ Ω are connected in series across a 200V, 50Hz supply. Find current, active power, reactive power, apparent power and power factor of the whole circuit. 7

5. a) A 400V, balanced Y-connected supply is connected to three equal impedances $(40 + j30)$ Ω in a Y formation. Calculate: phase current, line current, power factor and total power. Also draw the phasor diagram. 8

b) Explain the principle of operation of synchronous motor. 7

6. a) A 25 KVA, 3300/1100 V, 50 Hz single phase transformer has primary and secondary winding resistances of 0.2Ω and 0.06Ω respectively. The primary and secondary winding leakage reactances are 0.32Ω and 0.012Ω respectively. Find the equivalent winding resistance, reactance and impedance referred to
 i. HV side
 ii. LV side. 8

b) A shunt generator has induced voltage of 250 V. When the machine is loaded, the terminal voltage drops down to 230 V. Determine the load current if the armature resistance is 0.05Ω and the field circuit resistance is 23Ω . 7

OR

Explain operating principle of 3 phase induction motor.

7. Write short notes on: (Any two)

 - a) Maximum power transfer theorem
 - b) Ideal and practical voltage source
 - c) Transformer efficiency
 - d) Power factor and its significances

POKHARA UNIVERSITY

4. a)

Level: Bachelor
Programme: BE
Course: Basic Electrical Engineering

Semester: Fall

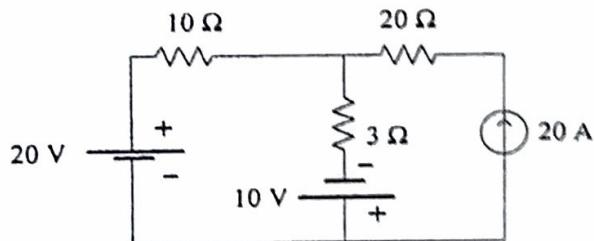
Year : 2017
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

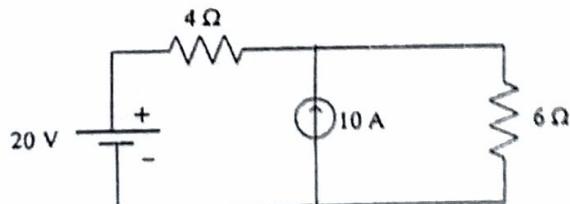
Attempt all the questions.

1. a) Throw light on role of electricity in modern society. 5
- b) What are the ideal and non-ideal (practical) sources? Explain each briefly. 5
- c) What is power factor and explain its significances. 5
2. a) Using superposition theorem, find the current through 10Ω resistor of the circuit as shown below. 8



b)

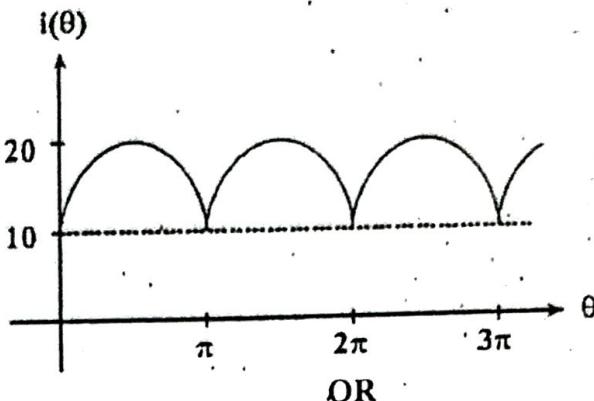
- b) Differentiate between Thevenin's theorem and Norton's theorem. Also find the voltage across 6Ω resistance by using Norton's theorem. 7



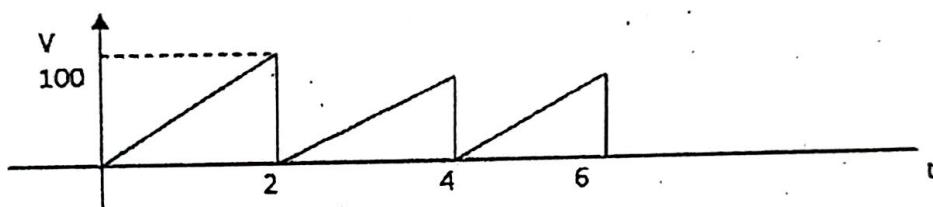
5. a)

3. a) Compare mesh analysis and nodal analysis. Find node potentials for the given network. Also find the power dissipated in 3 ohm resistor. 8
- b) Write the difference between series resonance and parallel resonance? Show that the bandwidth for the series resonant circuit is the ratio of resonant frequency and quality factor. 7

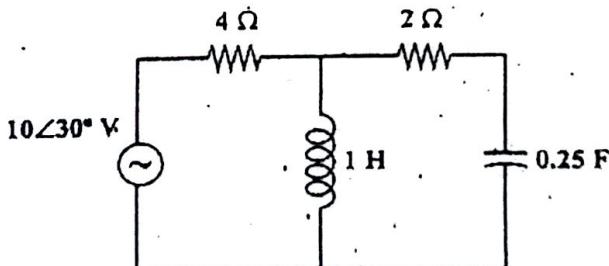
4. a) What are advantages of AC over DC? Find the average and rms value of the given waveform. Also find the form factor. 2+6



Calculate the mean value and effective value of the wave shown. 8



- b) For the given circuit determine:
- circuit impedance
 - supply current and its phase angle
 - circuit power factor
 - active, reactive and apparent power.



5. a) Three similar coils having impedance of $15\angle 20^\circ \Omega$ are connected in star to 400v, 3φ, 50HZ supply. Calculate:
- line and phase current
 - Power factor
 - Total 3φ powers

- b) Define transformer and deduce the expression for EMF. 8
6. a) 25KVA, 1 ϕ , 250/500v transformer gives the following results on tests: 7

Open circuit test	200V	1A	70W
Short circuit test	25V	5A	80W

Calculate:

- Parameters of the transformer
- Secondary terminal voltage if it supplies 50A at 0.8 pf lag

OR

A 250 V DC shunt motor takes 8A line current on no load and runs at 1000 rpm. The resistance of the field winding and armature winding are 200Ω and 0.8Ω respectively. If the full load line current is 20A, calculate the full load speed, assuming constant air gap flux.

- b) Explain the working principles of 3 - Ø synchronous motor. 8
7. Write short notes on: (Any two) 2x5
- 3 ϕ induction motor
 - Three phase power measurement by two wattmeter method
 - Maximum power transfer theorem

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Basic Electrical Engineering

Semester: Spring

Year : 2017
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

b) Expl
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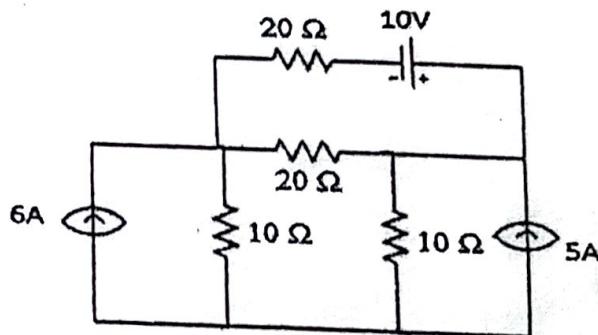
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

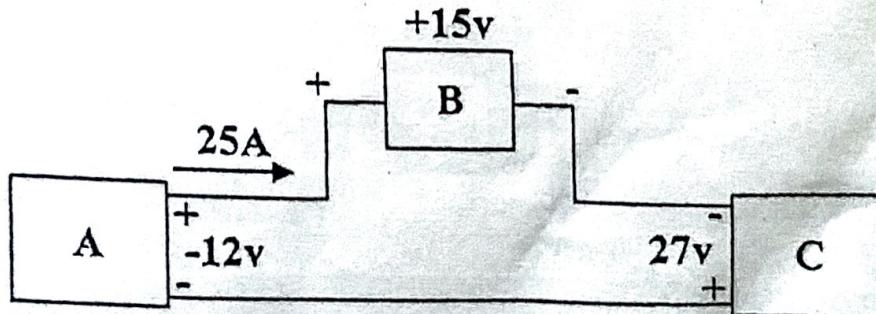
1. a) Explain generation, transmission and distribution with the help of single line diagram. 7
 b) Using Node voltage method, find the current through each 10Ω resistors of the circuit as shown below. 8

3. a) Solv
belo



2. a) For the circuit shown below 8
 i. Determine which components are absorbing power and which are delivering power
 ii. Is conservation of power satisfied? Explain your answer.

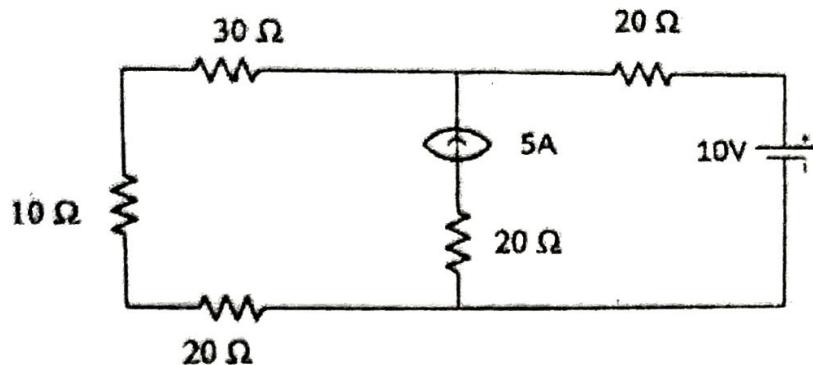
b) Cal
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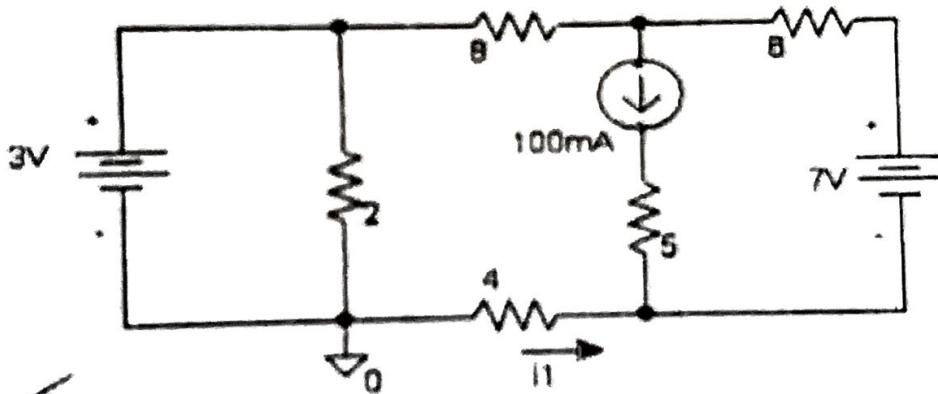
4. a) A s
0.31
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b) Explain Thevenin's theorem. Also find the current across 10Ω resistance by using Norton's theorem. 7



3. a) Solve for the current i_1 (through the 4Ω resistor) in the circuit shown below using superposition theorem. (All resistors are in Ohm). 8

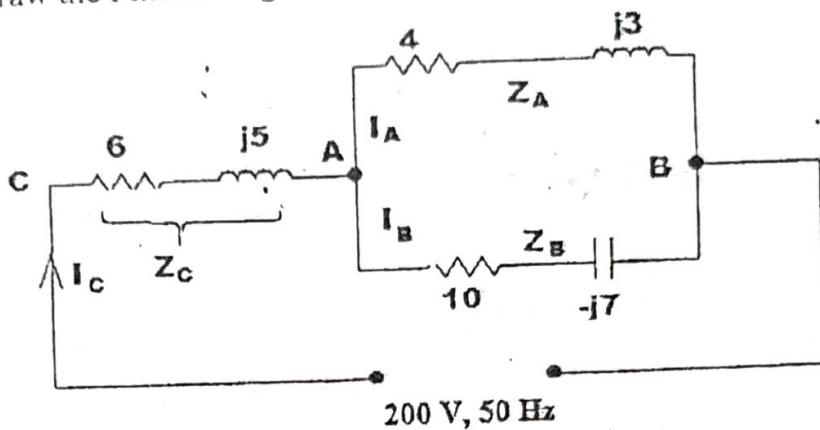


b) Calculate the average value, RMS (effective) value and form factor of the output of half wave rectifier when the input to the rectifier is a purely sinusoidal alternating current. 7

4. a) A series RLC circuit consists of a 100Ω resistor, an inductor of $0.318H$ and a capacitor of unknown value. When this is energized by $v = 230\sqrt{2}\sin\omega t$ Volts supply, the current was found to be $i = 2.3\sqrt{2}\sin\omega t$ Amperes. Find i. value of capacitance, ii. Voltage across the inductor and iii. Total power consumed (Assume $\omega = 314.15$ rad/sec) 7

b) In a series, parallel circuit two impedances are connected with series impedance as shown in figure below. If the voltage applied to the circuit is $200V$, $50Hz$. Calculate: 8

- i. Current I_A , I_B and I_C
- ii. Voltage across AB
- iii. Active and reactive Power of the entire circuit
- iv. Draw the Phasor diagram



- | | | |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 5. | a) Explain the differences between single phase and three phase system. | 4 |
| | b) List out the advantages and disadvantages of star connected supply. | 4 |
| | c) Explain the practical transformer with the help of phasor diagram with unity power factor load. | 7 |
| 6. | a) A 250V shunt motor on no load runs at 1000rpm and takes 5A. The total armature and shunt field resistance are respectively 0.2Ω and 250Ω . Calculate the speed when loaded and taking a current of 50A, if the armature reaction weakens the field by 3%. | 7 |
| | b) Explain the construction and operating principle of 3ϕ induction motor. | 8 |
| 7. | Write short notes on: (Any two) | 2×5 |
| | a) Star/Delta transformation | |
| | b) Two wattmeter method of power measurement | |
| | c) Speed control of dc motor | |

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2018

Programme: BE

Full Marks: 100

Course: Basic Electrical Engineering

Pass Marks: 45

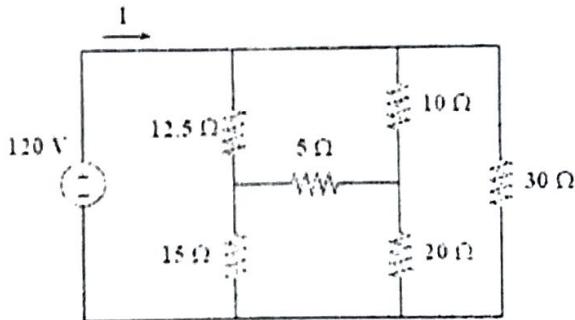
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

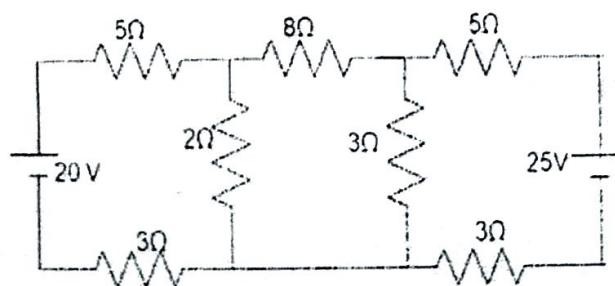
The figures in the margin indicate full marks.

Attempt all the questions.

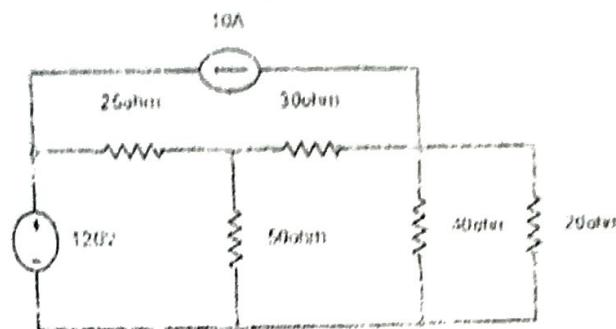
1. a) Explain present Energy scenario and role of electricity in context of 7
Nepal.
b) Obtain the equivalent resistance and use it to find source current for the 8
circuit shown below.



2. a) Explain KCL and KVL. Find the node voltage at each nodes using 7
nodal analysis for the given circuit.

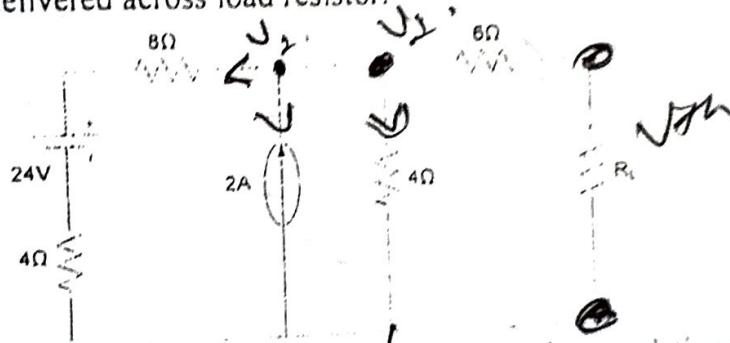


- b) Compare Thevenin's theorem with Norton's Theorem. Also find the current across 25Ω resistance by using Norton's theorem. 8



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3. a) Calculate the value of R_L & power dissipated such that maximum power is delivered across load resistor. 8



\rightarrow
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 \rightarrow
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- b) What is a phasor? Determine the current-voltage relationship for passive elements in phasor domain as well as time domain. 7

4. a) Two impedances $(20+j5)\Omega$ and $(30+j8)\Omega$ are connected in series across a 400V, 60Hz supply. Find current, active power, reactive power, apparent power and power factor of the whole circuit. 8

- b) Explain resonance in parallel RLC circuit.

5. a) Explain how the three phase voltage is generated. Write the advantages of three phase system over single phase. 8

- b) Three similar coils, each having a resistance of 100Ω and an inductance of $20mH$ are connected in i) star ii) delta to a 3-Φ, 50 Hz, with 400V between lines. Calculate: 7

- i) Line current and phase current
ii) Active, reactive and apparent power

6. a) What are generators? Explain the types of excitation systems in 7
separately excited DC generator.

b) A transformer has 600 primary turns and 150 secondary turns. The 8
primary and secondary resistances are 0.25Ω and 0.01Ω respectively
and corresponding leakage reactance are 1.0Ω and 0.04Ω
respectively. Determine a) the equivalent resistance and reactance
referred to primary side b) Equivalent resistance and reactance
referred to secondary side.

7. Write short notes on: (Any two)

- a) Star/Delta transformation
- b) Operation of transformer on-load
- c) Working principle of 3-Φ induction motor

2×5