Prof. K. N. Sawalakhe

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BASIC ELECTRICAL ENGINEERING

Question Bank

Q1) Explain clearly about ideal and practical characteristics of the current and voltage source**. (5 marks).**
Q2) Find the equivalent resistance between A and C. All resistances are in ohm. Refer fig.1 **(7 marks).**

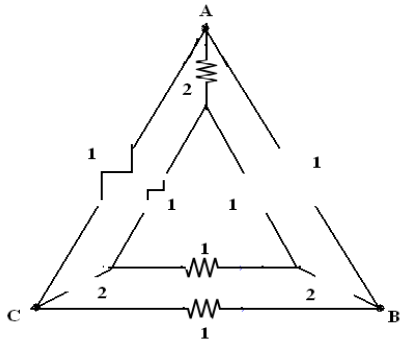


Fig. 1

Q3) Find the equivalent resistance between terminals A and B of circuit shown in following fig. using star-delta transformation. All resistances are in ohm. **(8marks).**

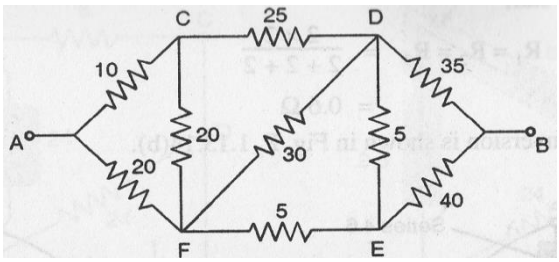


Fig. 2

Q4) For the network shown in following fig. 3, Calculate the voltage between points A and B. All resistances are in ohm. **(Sum-09; 5marks).**

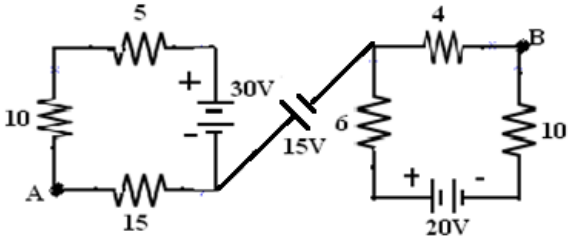


Fig. 3

Q5) Find the value resistance R and voltage V_s in the circuit shown in fig. 4. below All resistors are in ohm**. (7 marks).**

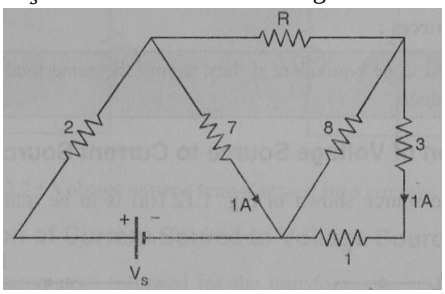
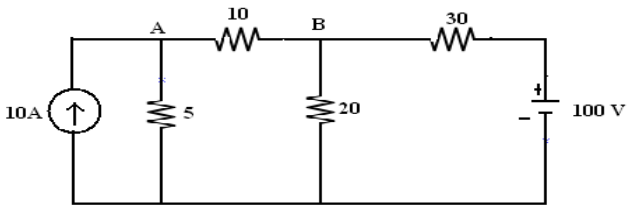


Fig.4

Q6) Find the current through AB using Superposition Theorem. All resistances are in ohm.Fig. 5.



Q7)State and explain Kirchhoff's voltage and current laws with suitable example . **5marks**

Q8) State and explain Superposition Theorem with suitable example. **5marks**

Q9) State Superposition Theorem and find the voltage across branch AB using Superposition Theorem. All resistances are in ohm. Refer fig 6. **(8marks).**

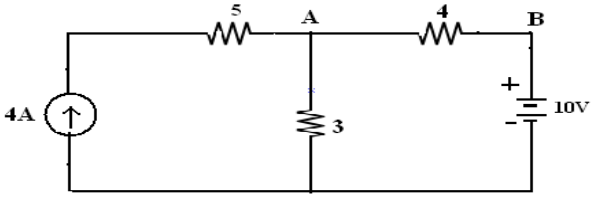


Fig. 6

Q10) Why is the voltage source short circuited and current source open circuited when they are removed while solving problem on Superposition Theorem.**(4marks).**

Q11) Using Superposition Theorem find current I_2 in 10Ω resistor. All resistances are in ohm. Refer fig. 7 **(4marks).**

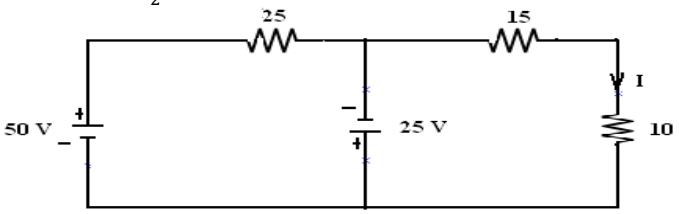


Fig. 7

Q12) Find voltage drop in 10Ω resistor in fig 8. given below. All resistances are in ohm.
(8 marks).

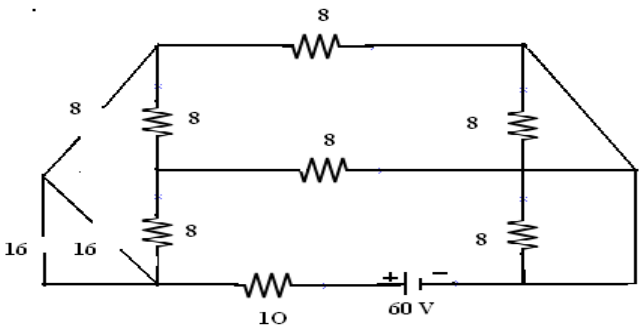
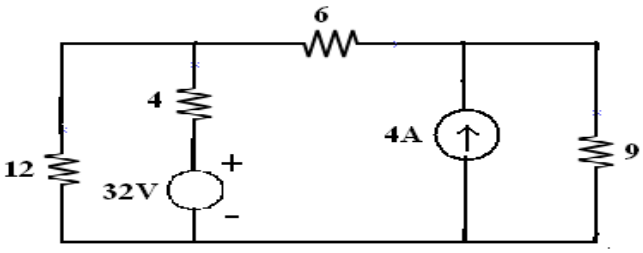
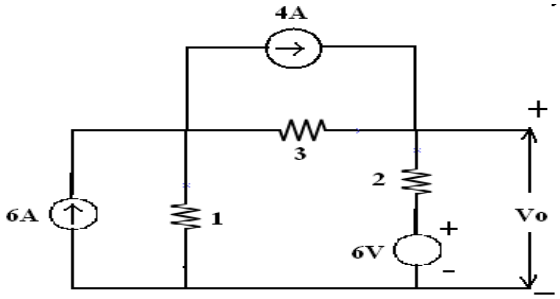


Fig. 8

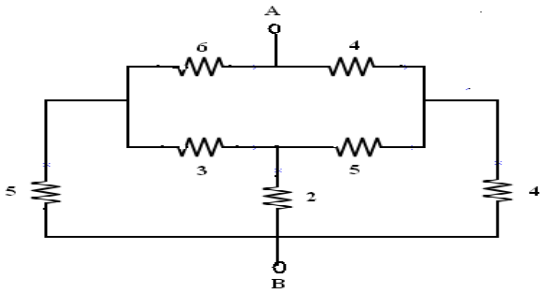
Q13) Calculate the current through 9 Ω resistor in the network by superposition Theorem. Also the power dissipated in 6Ω resistor. All resistances are in ohm**(7 marks).**



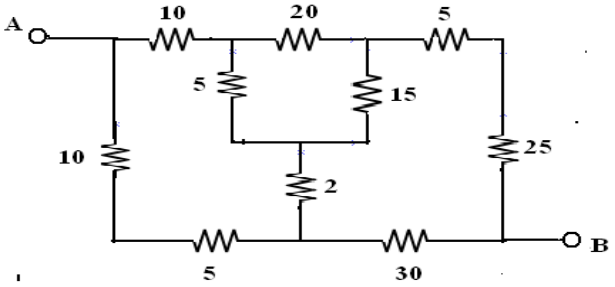
Q14) Using Superposition Theorem find the value of the o/p voltage V_0 in the circuit of fig. given below. All resistances are in ohm. **(7marks).**



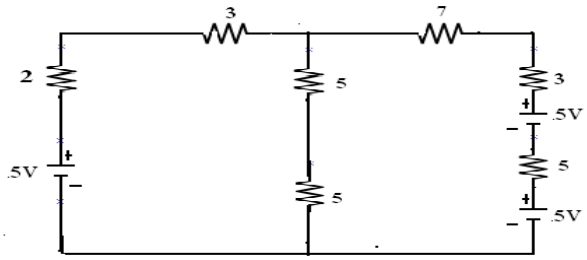
Q15) Determine the resistance between point A &B in network of fig. below. All resistances are in ohm.**(6marks).**



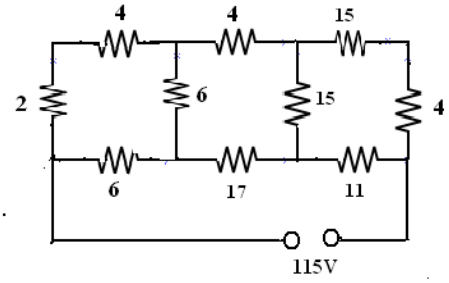
Q16) In the fig .,find equivalent resistance between points A and B. All resistances are in ohm. **(7marks).**



Q 17) Calculate the current through 2Ω resistor in the network by Superposition theorem. All resistances are in ohm.. **(8marks).**



Q18) Find the current through 11Ω resistor in the network by star-delta conversion. All resistances are in ohm. Fig 14. **(7marks).**



Q19) Find the total current through the (**8marks).**

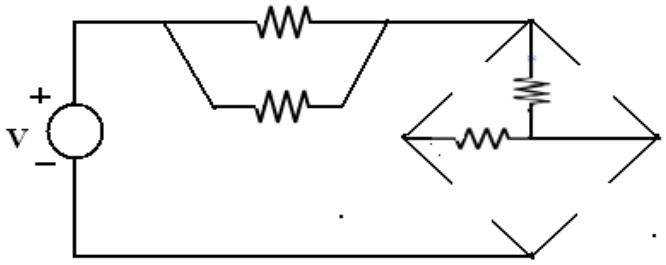


Fig. 15

MAGNETIC CIRCUITS

Series Magnetic circuits

Q1) An iron ring 8cm mean diameter is made up of round iron of diameter 1cm and permeability of 900, has an air-gap of 2 mm wide. It consists of winding with 400 turns carrying a current of 3.5A.Determine(i) mmf, (ii)Total reluctance,(iii)The flux,(iv)Flux density in ring.(**9marks)**

Q2) An iron magnetic circuit has uniform cross sectional area of $5cm^2$and length of 25cm.A coil of 120turns is wound uniformly over the magnetic circuit. When the current is 1.5A, the total flux is 0.3mwb; when the current is 5A, the total flux is 0.6mwb.For each value of current ,calculate:(i)the magnetizing force,(ii)the relative permeability of the iron.**(7marks**)

Q3) Two bars of same material with μ_r =800 having equal mean lengths of 10cm but area of cross sections 2cm^2 and 1 cm^2 are bent in the form of semicircle and joined to form a closed ring. Calculate AT required to produce 1Wb/m^2 flux density in the smaller ring. neglect the air gap leakage and fringing effect. **(7marks)**

(Ans:AT=149)

Q4) A metal ring of mean diameter of 80 cm is made out of two semicircular pieces of cast iron & cast steel having same cross sections & separated at a junction by pieces of copper each of 1mm thickness. If the ring is uniformly wound with 1000 turns, calculate the value of current required to produce a flux density of 0.85 wb/m in the ring, given that relative permeability of cast iron as 200 and that of cast steel is1200 & for copper μ_r=1. **(Ans: I=6.31A)**

Q5) An iron core is rectangular in shape has a mean length of 50cms.It has a saw cut in one of its length of 2mm width. One of the limb of this core has a coil on it having 100turns.Find the current required to flow in the coil to produce an air gap flux density of 0.75wb/m^2. Neglect leakage and fringing effects. Take μ_r =600. **(6marks)**

Q6) A ring has a mean diameter of 21cm and a cross sectional area of $10cm^2$.The ring is made up of semicircular sections of cast iron and cast steel, with each joint having an air gap of 0.2mm. Find the ampere-turns required to produce a flux of $8\ x\ 10^{-4}$web. The relative permeabilities of cast iron are 800 and 166 respectively. Neglect leakage and fringing effects. **(8marks)**

Q7) A cast iron ring of 40cm mean length and circular cross section of 5 cm diameter is wound with the coil. The coil carries a current of 3 A & produces a flux of 3 m Wb in the air gap. The length of air gap is 2 mm. the relative permeability of cast iron is 800. The leakage coefficient is 1.2. calculate number of turns of the coil.**(Ans: N=1053)**

Q8) A soft iron ring of 20cm mean diameter and circular cross section of 4 cm diameter is wound with magnetizing coil. A current of 5A flowing in the coil produces a flux of 2.5m Wb in the air gap of 2.2mm wide. Relative permeability is 1000 and leakage co-efficient is 1.2. find the number of turns on the coil. **(7marks)**

Q9) A cast steel ring of mean diameter 30cm having a circular cross- section of $5cm^2$ is uniformly wound with 500 turns Determine the magnetizing current required to establish a flux of 5x 10^{-4} webs.

(i) Without air gap, (ii) with a radial air gap of 1mm.The magnetization curve for cast steel is given by the following:**(7marks)**

(Ans: i) I=1.602A ii) I=3.19A)

B (web/m^2)	0.2	0.4	0.6	0.8	1.0	1.2
H(AT/ m)	175	300	400	600	850	1250

Q10) A series magnetic circuit comprises of three sections (i)length of 80mm with cross sectional area of $60mm^2$,(ii) length of 70mm with cross sectional area of $80mm^2$ and (iii)air gap of length 0.5mm with cross-sectional area of $60mm^2$.Sections (i) and(ii) are if a material of magnetic characteristics given by following table:

B (web/m^2)	0.2	0.4	0.6	0.8	1.0	1.2
H(AT/ m)	100	210	340	500	800	1500

Determine the current necessary in a coil of 4000 turns wound on section (ii) to produce a flux density of 0.7 Tesla in air-gap. Neglect magnetic leakage. **(7marks**) (Ans: i) I=0.827A)

Q11) An iron ring of mean magnetic path length 30cm is made of three pieces of cast iron. Each has same length but their respective diameters are 4,3&2.5cm.An air gap of the length 0.5mm is cut in the 2.5cm diameter piece. If coil of 1000turns is wound on the ring. Find the value of current it has to carry to produce a flux density of 0.5wb/m^2 in the air gap.

The B-H curve characteristics of cast iron may be drawn from the following data: **(9marks) Ans: I=0.57A**

B (web/m^2)	0.1	0.2	0.3	0.4	0.5	0.6
H(AT/ m)	280	620	990	1400	2000	2800

A steel ring having a circular cross-sectional area of $5cm^2$ and a mean diameter of 25cm is wound uniformly with a coil of 500 turns. Calculate: (i)The current required to produce a flux of 0.5mwb in the ring,(ii)The current required to produce this flux when an air gap of 0.2cm is made in the ring. The magnetization curve for cast steel is given by the following: **(7marks)**

B (web/m^2)	0.2	0.4	0.6	0.8	1.0	1.2	1.4
H(AT/ m)	175	300	400	600	850	1250	2300

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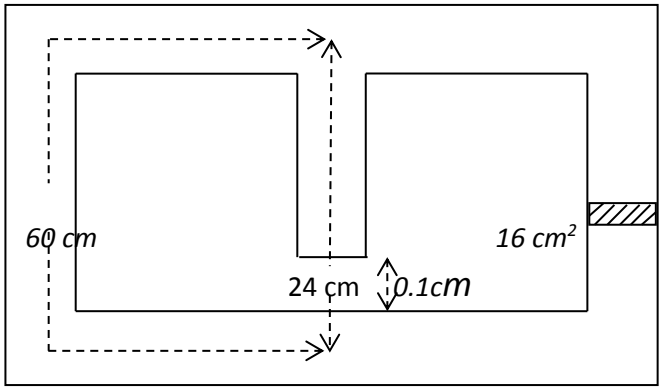
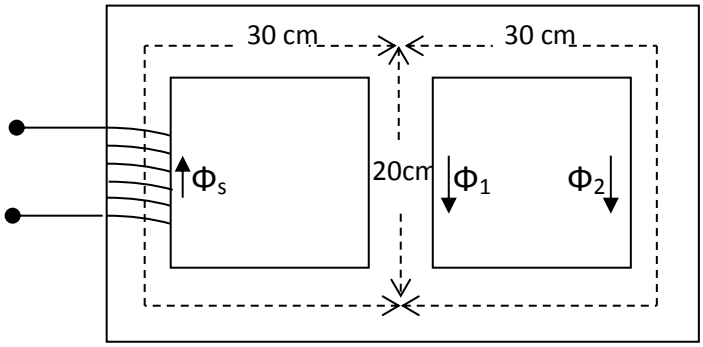
Parallel magnetic Circuits

Q12) A 680 turns coil is wound on central limb of cast iron frame shown in fig.no.1.Find the current required to produce a flux of 1.6mwb in the air gap. Neglect leakage and fringing. Area of central limb and side limb are same. Magnetizations curve is as follows: **(8marks)**

B (web/m^2)	0.4	0.6	0.8	1.0
H(AT/ m)	470	600	720	900

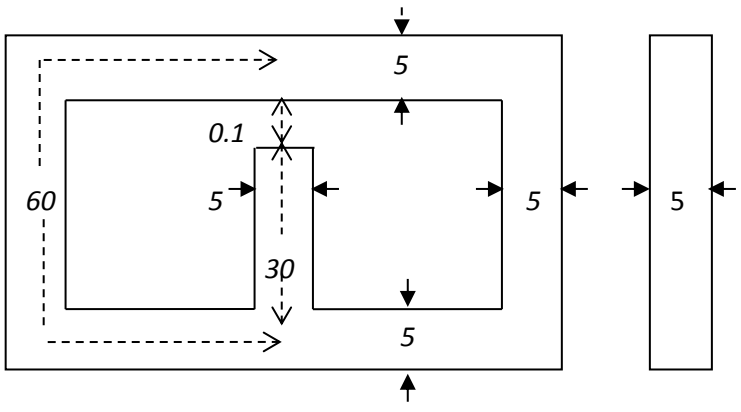


Q13) A cast steel magnetic structure made from a bar a section 8cm x 2cm is shown in following fig.no.2. Determine the current that the 500turns magnetizing coil on the left limb should carry so that flux of 2mwb is produced in the right limb. Take μ_r =600 and neglect leakage. **(7marks) Ans: I=3.48A**



Q14) Cast steel electromagnet shown in fig.no.3.has a coil of 1500turns on its central limb. Determine the current that the coil should carry to produce a flux of 2.5mwb in the air gap. Neglect leakage. The dimensions are in cm. Magnetization curve for cast steel is as under: **(Win-05,9marks**)

B (web/m^2)	0.2	0.5	0.7	1.0	1.2
H(AT/ m)	300	540	650	950	1150



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Q15) "Magnetic circuit is 'NOT' exactly like Electric circuit", Justify this statement by mentioning dissimilarities between them.
OR
Compare an electric circuit (DC) and magnetic circuit **OR**
State the similarities and dissimilarities of an electric circuit(DC) and magnetic circuit.

Q16) Define and explain following terms **for 2 marks each**:-

a) Magnetomotive force(mmf)
b) Leakage coefficient **OR** Leakage factor
c) Fringing
d) Reluctance
e) Magnetic Flux density
f) Residual flux **OR** Retentivity
g) Corecive force **OR** Corecivity
h) Leakage flux**(06)**
i) Relative permeability
j) Magnetic field strength/intensity **OR** Magnetizing force
k) Magnetic flux
l) Magnetic Leakage

Q17) What is B-H curve? What information do you get from this curve? **(6marks)**

Q18) Define Hysteresis effect and Hysteresis Loss. Explain the necessity of obtaining a B-H curve loop for a magnetic material **(6marks)**

Unit-III AC Circuits

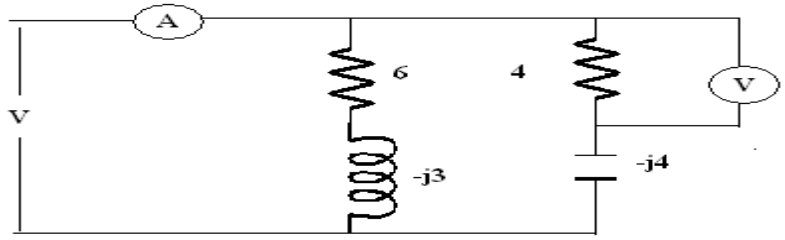
SINGLE PHASE AC CIRCUITS

1) Explain following terms in term of AC voltage:(i)Average value;(ii)RMS value;(iii)Form factor;(iv) Peak factor;(v)Frequency;(vi)Power factor;(vii)Impedance**.(7m**) IMP
2) Define the following terms with respect to A.C. circuits:-(i) Instantaneous value;(ii) Cycle;(iii)Time period(T);(iv)Frequency;(v)Amplitude;(vi)Phase angle;(vii)Angular frequency**.(6m)**
3) Calculate average value, rms value and form factor of the output of half wave rectifier when input to rectifier is purely sinusoidal alternating current**.(5m)**
4) Define RMS value. Derive the expression for rms value of sinusoidal voltage. (**6m)**
5) Define the "Resonance" as applicable to simple RLC series circuit. Discuss briefly the effect of resonance on circuit performance.(**5m)**
6) Draw phasor diagram for following:

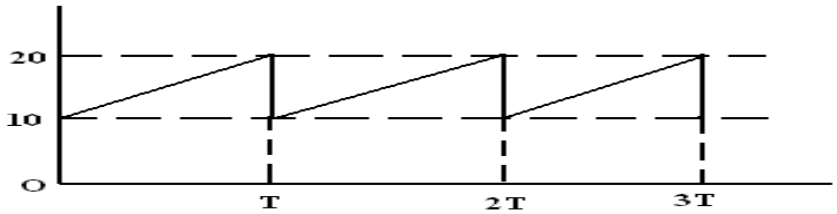
   (i)Choke coil connected in series with resistance and capacitor such that $X_L > X_c$ where $X_L =$ Inductive reactance of choke coil.

   (ii)Inductive coil is connected in parallel with a capacitor and the combination is connected across a.c. supply. **(6m)**

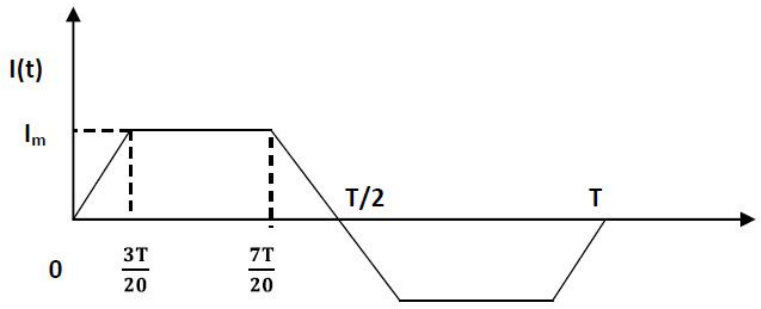
7) If the voltmeter in following fig,no.2 reads 60V, find the reading of the ammeter.**(6m)**



8) What is the significance of rms value and average value of a wave? Determine rms and average value of the wave form shown in the fig.no.1(**7m)**



9) Find the rms value, average value, form factor and peak factor of the waveform shown in fig.3 **(5m)**



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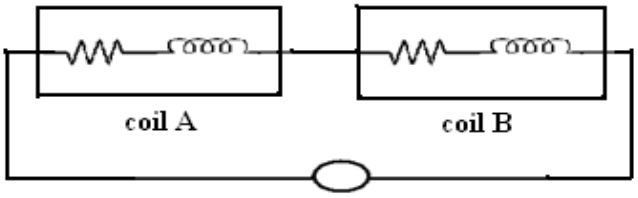
Series AC Circuits

10) A current of 5A flows through a non inductive resistance connected in series with a choke coil when supplied at 250V,50Hz.If voltage across resistance is 125V and across coil is 200V calculate:
(i)Impedance, resistance and reactance of coil; (ii)Power in coil;
(iii) Total power consumed in the circuit. (iv)Draw phasor diagram.**(8m)**

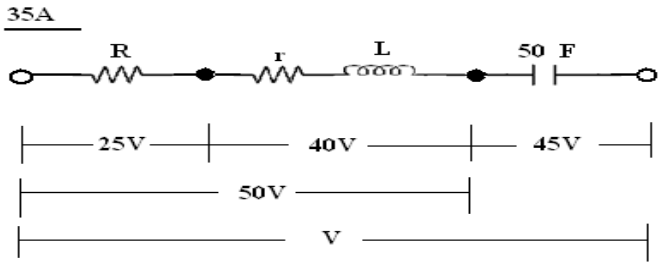
11) Two choke coils are connected in series as shown in fig.5. Internal resistance and its inductive reactance of coil A is 4Ω and 8Ω respectively. Supply voltage is 200V.Total power consumed in the circuit is 2.2kW and reactive power consumed is 1.5kVAR. Find the internal resistance and inductance of coil B**.(S-04;7m)**



12) A two-element series connected across an a.c. source e=$200\sqrt{2}\sin(wt+20°)\,V$. The current in the coil then is found to be $i = 10\sqrt{2}\cos(314t-25°)\,A$. Determine the parameter of circuit**.(8m)**

13) Two impedances Z_1 and Z_2 when connected separately across a 230V,50Hz supply consume 100 watt and 60watt at a power factors of 0.5 lagging and 0.6 leading respectively. If these impedances are now connected in series across the same supply,find:(i)total power absorbed and overall power factor.(iii)the value of the impedance to be added in series so as to raise the overall power factor to unity.**(7m)**

14) For the series a.c. circuit shown in fig.no.4 and with the current and voltages as indicated, calculated the values of R, r and L and frequency of the applied voltage and its magnitude.**(7m)**



15) An inductive coil of resistance 32Ω and reactance 15.7Ω is connected in series with a capacitive reactance 79.5Ω. The circuit as a whole is connected across 500V a.c. supply. Determine: (i)Current;(ii)Power factor;(iii)Voltage across inductive coil;(iv)Total power absorbed.**(8m)**

Resonance in AC Circuits

16) 20Ω resistor is connected in series with an inductor capacitor and an ammeter across 25V variable frequency supply. When the frequency is 400Hz,the current is at maximum value of 0.5A and parallel difference across capacitor is 150V.Calculate:(i)Capacitance of capacitor;(ii)Resistance and inductance of the inductor**.(6m)**

17) A circuit having resistance 5Ω and reactance 0.4Ω H and a variable capacitor in series, is connected across 110V, 50Hz ac Supply. Calculate (i)The value of capacitance to give resonance;(ii)current at resonance;(iii)Voltage across inductor;(iv)Q-factor of the circuit (V) Resonance Frequency.**(7m)**

18) Define Root Mean Square (RMS) and Average Value. A sinusoidal alternating voltage has an rms value of 200V and frequency of 50Hz.It crosses zero at the t=0 and increases in a positive direction. Determine:-
(i)The time when voltage first reaches the instantaneous value of 200V and (ii)The time when voltage after passing through its maximum positive value of 141.4V**.(7m).**

19) Find the resultant voltage obtained by adding the following voltages and draw phasor diagram:-
$V_1 = 100\sin(wt)$; $V_2 = 50\sin(wt-\frac{\pi}{6})$;$V_3 = 100\sin(wt+\frac{\pi}{4})$;Also obtain rms value of the resultant voltage**. (7m)**

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20) The equation of voltage and currents in two element series circuit are: -

$v(t) = 325.3 \sin(6.28\ kt + \frac{\pi}{3})$ volts.

$i(t) = 14.142 \sin(6.28\ kt + \frac{\pi}{3})$ Amp.

(i)Plot the power p(t) on wave diagram.
(ii) Determine power factor and its nature.

Parallel AC Circuits

21) The currents in each branch of a two branched parallel circuit is given as;

$i_a = 7.07\sin(314t - \frac{\pi}{4})$; $i_b = 21.2\sin(314t + \frac{\pi}{3})$ and supply voltage is v=354 sin 314t. Calculate: (i)Total current in the same form; (ii)Calculate ohmic value of components in each branch**.(7m)**

22) A coil of inductance 80mH and resistance 120Ω is connected to a 220V,50Hz single phase supply. In parallel with it is a series combination of 16μF capacitor and a 40Ω non-inductive resistor B. Determine the power factor of combined circuit, the total power taken from the supply and current through each branch**.(9m)**

23) Two impedances $Z_1\ and\ Z_2$ are connected in parallel across applied voltage of (100+j200)volts.The total power supplied to the circuit is 5kW at unity PF. The first branch takes a leading current of 16A and has resistance of 5Ω while second branch takes a lagging current at 0.8 power factor. Calculate: (i)Current in second branch;(ii)Total current;(iii)Circuit constants**.(8m)**

24) A circuit consists of the following THREE branches:-

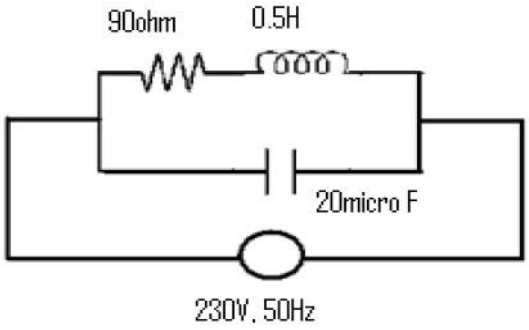
Branch 1: Resistance R_1 =25Ω; Branch 2: Impedance $Z_1 = (4 + j8)\Omega\ and$ Branch 3: Impedance $Z_2 = (6 - j10)\Omega$

Branches are connected in parallel across 200V, 50Hz a.c. supply. Calculate: (i)Currents I_1, I_2, I_3;(ii)Power factor of each branch;(iii)Total current and power factor; (iv)Equivalent impedance of the circuit. **(6m).**

25) A 100Ω resistance shunted by a 0.4H inductor is in series with a variable capacitor C. A voltage of 250V at 50Hz is applied to the circuit.

Find: (i)the value of C to give unity p.f.;(ii)the total current;(iii)the current in the inductor. Also, draw phasor diagram**.(8m)**

26) For the circuit shown below in fig.no.6, find:-(i)Total current;(ii)p.f. of the circuit;(iii)Total power taken from the source;(iv)Energy stored in inductor and capacitor**.(7m)**



THREE PHASE AC CIRCUITS

1) a)Derive the relationship between phase current and line current in delta connected balanced load. **(7m)**
   b) Derive the relationship between phase and line quantities (voltage and current) for a 3-phase balanced star system**.(6m)**
   c)Prove that the power consumed in balanced 3-phase delta connected load is 3-times the power consumed in star connected load**.(5m).**
2) Explain three phase generation of voltage.**(6m)**
3) Three similar coils, connected in star, take a total power of 1.5kw at a p.f 0.2 lagging from a 3-phase,400V,50Hz supply. Calculate the resistance and inductance of each coil**.(7m)**
4) Three similar coils each having a resistance of 20Ω and inductance of 0.05H are connected in (i)Star,(ii)Delta to a 3-phase, 50Hz supply with 400V between lines. Calculate the total power absorbed and the line current in each case. If the coil are connected in delta across the same supply, what will be the power factor, total power absorbed and line current?**(7m)**
5) Three coils having 3Ω resistance and 4Ω inductive reactance each are connected in delta. Find the line current drawn and power absorbed when these delta connected coils are supplied from 3-phase, 100V supply. Draw phasor diagram showing all phase and line quantities.**(8m)**
6) Three identical coils of (9+j12)Ω are connected in delta to a 440V, 50Hz,3-phase supply. Calculate: (i)line current;(ii)Power factor;(iii)Total kilovolt amperes;(iv)Total kilowatts**.(7m)**
7) A 3-phase, 230V supply is given to balanced load which is delta connected. Impedance in each phase of the load is 8+j6 Ω. Determine the phase current and the total power consumed. Draw the phasor diagram showing all the currents and voltages. **(7m)**
8) Three resistances each of 500Ω are connected in star to a 400V,50Hz, 3-phase supply. If three capacitors, when connected in delta to the same supply, take the same line currents, calculate the capacitance of each capacitor and the line current**.(7m)**
9) A series combination of 3Ω resistance and a 796.18μF capacitor in each branch forms a three phase star connected balanced load which is connected to a 415V,3-phase,50Hz a.c.supply.
   Calculate:-(i)The power consumed and ;(ii)The current drawn by the load. If the same load is now connected as a 'delta' determine the resultant.**(8m)**
10) A 3-phase load consist of 3 similar inductive coils, each of resistance 50Ω and inductance 0.3H. The supply is 415V,50Hz. Calculate:(i) the line current,(ii) the power factor,(iii)total active and reactive power when the load is delta connected. Draw the phasor diagram.(**8m)**
11) Three identical impedances are connected in delta to a 3-phase supply of 400V. The line current is 35A and total power taken from supply is 5kW.Calculate the resistance and reactance of each impedance**.(5m)**
12) A delta connected load draws a current of 20V at a lagging power factor of 0.8 from a 400V,3-phase,50Hz supply, Calculate:(i)Resistances and inductance of each phase;(ii)Power consumed**.** **(7m)**
13) A 3-ø star connected load when supplied from 440V,50Hz source takes a line current of 12amp lagging w.r.t. line voltage by 70°. Calculate:(i)Impedance parameters;(ii)Power factor and its nature;(iii)Total power consumed;(iv)Draw phasor diagram indicating all voltages and currents**.(8m)**

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TRANSFORMER:

1) "Transformer is a constant flux machine" Justify**. IMP(6m)**

2) What do you mean by efficiency of a transformer? Derive the condition for maximum efficiency of a transformer**. vIMP (6m)**

3) The transformer operates at every low power factor when it is unloaded. Explain**.(5m)**

4) Define eddy current and hysteresis loss occurring in transformer core. Why are these losses known as constant loss?(**6m)**

5) Explain open circuit (O.C) and short circuit (S.C) test of 1-ø transformer in detail. **IMP (5m)**

6) Draw the complex phasor diagram of a transformer for lagging power factor**.(5m)**

7) Draw the phasor diagram of transformer when its secondary is loaded with lagging power factor load**.(5m)**

8) Draw the phasor diagram of a 1-ø transformer for resistive and inductive loads connected to it. **(7m)**

9) Why transformer is rated in KVA**.(2m)**

10) Derive EMF equation of single phase two winding transformer**.(4m)**

11) a) In making the core the joints of the laminations are placed in alternate layers. Why? **(2m)**
b) In practical transformer, half of the primary and half of the secondary is placed on the same limb. Why? **(2m)**
c) While performing O.C.test, why the h.v. winding is generally kept open circuited? **(2m)**
d) Justify "If the core is laminated eddy current losses decreases**".(2m)**

12) Explain the working of transformer on load and Draw the phasor diagram for Ideal transformer**.(7m)**

13) Explain the working of transformer (i) on no load (ii) on load **(7m)**

14) A 1-ø transformer has 1000 turns on primary and 200 turns on secondary. The no load current is 3 A at the power factor 0.2 lagging Calculate primary current and power factor when the secondary current is 280 A at a power factor of 0.8 lagging**.(7m)**

15) A 660 Volts by 220 volts single phase transformer takes a no load current of 2 amperes at a power factor of 0.225 lagging. A transformer supplies a load of 30A at a power factor of 0.9 lagging. Calculate the current drawn by the primary and the primary power factor. Neglect winding resistance and reactance. **(6m)**

16) The no load current of transformer is 15A at a power factor of 0.2 when connected to a 460V,50Hz supply. If the primary winding has 550 turns. Calculate (a)the magnetizing component of no-load current,
(b)the iron loss component of no-load current, (c)the maximum value of the flux in the core**.(7m)**

17) A 400/200V,1ø transformer is supplying a load of 40A at the power factor of 0.866 lagging. The no load current is found to be 1.8 A at 0.208 PF lagging. Calculate the current and power factor on primary side of the transformer**.(7m)**

18) A transformer has a primary winding of 800 turns and secondary winding of 200 turns. When the load current on the secondary is 80A at 0.8 p.f. lagging, the primary current is 25A at 0.707 p.f. lagging. Determine the No load current and its power factor.**(6m).**

Equivalent Circuit

19) A 30kVA,2400/120 V,50Hz transformer has a high voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω.The low voltage winding resistance is 0.035Ω and the leakage reactance is 0.012Ω.Find equivalent winding resistance, reactance and impedance referred to the(i) high voltage side and (ii)the low voltage side**.(7m)**

Efficiency & Regulation

20) A 10kVA,500/250 V,1-ø transformer has its maximum efficiency of 94% of its rated output at unity power factor. Estimate its efficiency when delivering full load output at power factor of 0.8 lagging**.(8m)**

21) A 50kVA transformer has on full load a copper loss of 600 watts and iron loss of 500 watts. Calculate maximum efficiency and the load at which it occurs.**(6m)**

22) A 200kVA transformer has an efficiency of 98% at full load. The maximum efficiency occurs at three quarters of full load. Calculate the efficiency at half load. Assume negligible magnetizing current and power factor of 0.8 lagging at all loads.**(7m)**

23) A 200kVA,440/220V,single phase,50Hz transformer has iron loss of 324W.The copper loss is found to be 100W when delivering half of full load current Determine:
(i)efficiency when delivering full load current at 0.8 lagging power factor and
(ii)the percentage of full load when the efficiency will be maximum.**(7m)**

24) A 4 kVA,200/400V, 1-ø transformer has equivalent resistance and reactance referred to low voltage side equal to 0.5Ω and 1.5Ω respectively. Find the terminal voltage on the high voltage side when it supplies 3/4 th of full load at power factor of 0.8, the supply voltage being 200V.Hence,find the output of the transformer and its efficiency if the core losses are 100W.**(9m).**

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Open Circuit & Short Circuit Tests

25) A 100kVA,6600/250V,50Hz transformer gives the following test results:
O.C. test **:** 900W,normal voltage , S.C. test : 290V,12A,860W on H.V. side.
Calculate(i)the efficiency and percentage voltage regulation at full load at 0.8 power factor lagging (ii)the load at which maximum efficiency occurs**.(8m)**

26) A 5kVA 250/500 V single phase ,50Hz transformer gave the following test results:-
S.C. test:-with low voltage winding short circuited20V,10A,100W
O.C. test :-250V,1A,80W on low voltage side
Determine:-1)The circuit constants,
2)Efficiency at Full load at0.8 lagging power factor,
3) Efficiency at half load at Unity power factor**.(9m)**

27) A 5kVA,2300/230V,50Hz transformer was tested for the iron losses with normal excitation and Cu losses at full load and these were found to be 40W and 112 W respectively. Calculate the efficiencies of the transformer at 0.8 power factor for the following KVA outputs:-1.25,3.57 and 7.5**.(7m)**

28) A 5kVA,250/500V,1ø transformer gave following test data:
at No Load: 250V,0.6A,50W(L.V. Side) Short ckt.:9V,6A,24W(H.V.Side) Calculate:(i) The magnetizing current and the components corresponding to iron loss at normal voltage and frequency.(ii)The efficiency at full load unity pf (iii)The corresponding terminal voltage at 0.8 p.f. lagging**. (9m)**

29) The instrument readings obtained from open and short circuit tests on 10kVA,415/120V, 50Hz transformer are:
O.C. test: 415 V,1.2A,80W reads on high voltage side, S.C. test:2.6V,83.25A,120W with h.v.winding short circuited.
Compute:(i)Full load efficiency and voltage regulation for 0.8 p.f.lag:;(ii)Half load efficiency and voltage regulation at unity p.f.(iii) Draw the equivalent circuit**.(8m).**

30) A 5kVA,500/250V,50Hz.1ø transformer gave the following readings :- O.C.test:500V,1A,50W(LV side open)
S.C. test:25V,10A,60W(LV short circuited) Determine:-
i)The efficiency on full load,0.8 p.f. lagging,(ii)The voltage regulation on full load 0.8 p.f. leading;(iii)The efficiency on 60% of full load,0.8p.f.leading p.f.(iv)Draw the equivalent circuit referred to primary and insert all the values in it.**(14m)**

31) The test result obtained from open and short circuit tests on 10kVA,450/120V,50Hz,1ø transformer are:
O.C.test: 120V,4.2A,80W- on the low voltage side.
S.C.test:9.65V.22.2A, 120W-on the high voltage side. Calculate:-i) the equivalent circuit constants.(ii) Efficiency and voltage regulation for full load 0.8 power factor lagging.**(9m)**

32) Obtain the equivalent circuit of a 200/400V,50Hz,1-ø transformer from the following test data:
O.C.test **:** 200V, 0.7A,70W on L.V.side ;
S.C.test : 15V,10A,85W on H.V.side.
Calculate the secondary voltage and regulation when delivering 5kW at 0.8 p.f.lagging, the primary voltage being 200V.**(9m)**

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