14EE105

b) A pure inductance of 318 mH is connected in series with a pure resistance of 75 Ω. The circuit is supplied from 50 Hz source and the voltage across 75 Ω resistor is found to be 150 V. Calculate the supply voltage and the phase angle.

c) A circuit consisting of branches A and B are connected in parallel, is connected across a 220 V 50 Hz supply.
Branch A : A resistance of 7 Ω in series with 0.0125 H inductor.
Branch B : A resistance of 8 Ω in series with 1000 μF capacitor. Find the branch currents and the total current. Draw the phasor diagram.

Unit – III

5. a) Show that in a star connected 3-Φ balanced system, the sum of two wattmeter readings gives the total power consumed by the 3-Φ load. Draw the phasor diagram. Also, calculate the power factor using the two wattmeter readings.

b) What are the advantages and disadvantages of an autotransformer? List out applications.

c) Show that in an induction type 1-Φ energy meter in a given period of time, the total number of revolutions of the rotating disc is proportional to the electrical energy consumed by the load.

6. a) Establish the relationship between the line and phase, voltages and currents in a 3-Φ star connected system. Draw the phasor diagram. Also, calculate the total power delivered to the system to a 3-Φ balanced load.

b) Explain the principle of operation of a 1-Φ transformer.

c) With a neat diagram, explain the working principle of a permanent magnet type moving coil instrument.

Unit – IV

7. a) A 3 phase 12 pole alternator has a star connected winding with 132slots and 10 conductors per slot.The flux per pole is 0.03wb and speed is 375rpm.Find the frequency and the phase and line EMF if the distribution factor Kd=0.96 and the pitch factor [illegible]

b) A wave connected 230V, 4-pole 11KW shunt motor has 702 conductors and its resistance is 0.252 Ω. The flux per pole is 7.65 mWb and the armature current is 60A. Determine the speed of armature.

c) Draw the characteristics of DC series motor for i) Torque Vs armature current ii) Speed Vs armature current iii)Speed Vs Torque and explain.

8. a) Describe the working principle of DC motor and significance of Back emf in DC motor.

b) Calculate the EMF per phase induced in a 4 pole, three phase, 50 Hz star connected alternator with 36 slots and 30 conductors per slot. The flux per pole is 0.05 Wb. The coils are full pitched and the winding factor as 0.95.

c) A 4 pole lap connected dc generator has 600 conductors and runs at 1200rpm. The generator has total flux of 0.24web. Calculate the emf induced. Find the speed at which it should be driven to produce the same emf when wave connected.

Unit – V

9. a) Describe the working principle of a three phase induction motor.

b) Discuss the two way control of lamp.

c) With a neat sketch describe the working principle of sodium vapour lamp.

10. a) Describe the working principle of split phase resistance start induction motor.

b) Narrate the importance of grounding.

c) A three phase induction motor has 6 poles and runs at 960 r.p.m on full load. It is supplied from an alternator having 4 poles and running at 1500 r.p.m calculate the full load slip of the motor.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester B.E. (Credit System) Degree Examinations

Make up Examinations - January 2015

14EE105 – BASIC ELECTRICAL ENGINEERING

uration: 3 Hours | Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

a) Explain the term i) potential difference ii) resistance iii) current — 06

b) With the neat circuit diagram explain the concept of mutual induced EMF and derive the expression for mutual inductance. — 06

c) Two coils A and B have 600 and 1000 turns respectively. If a current of 4A in coil A establishes a flux of 5mwb in coil A and 2.5mwb in coilB, determine i) self inductance of coil A ii) mutual inductance — 08

a) Find the value of the input resistance of the circuit shown in fig 2a using star delta transformation. (RAB)

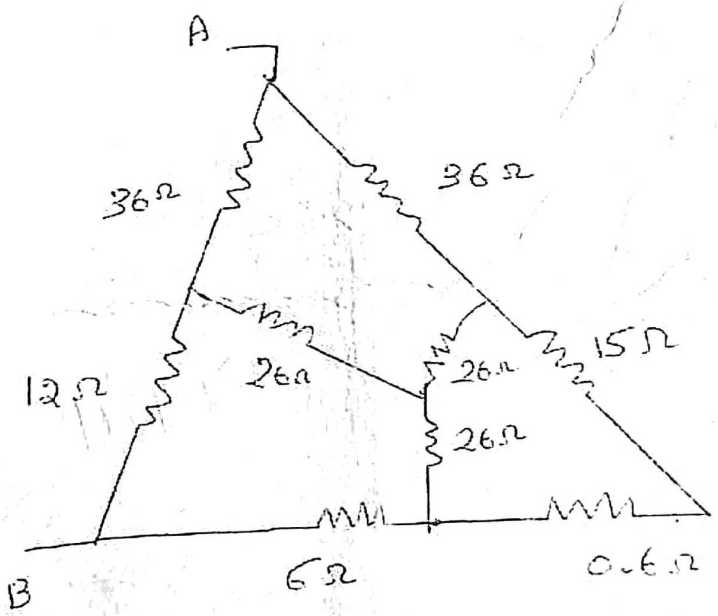

fig 2a — 08

b) Show that energy stored in inductor is ½ LI^2 — 06

c) Differentiate between statically induced e.m.f and dynamically induced e.m.f — 06

Unit – II

a) With neat waveform obtain an expression for the average power in a single phase series RL circuit — 08

b) A coil when connected to 200V, 50Hz supply takes a current of 10A and dissipates 1200 W. Find the resistance and inductance of the coil. — 06

c) A voltage v = 200 sin 314 t is applied to a circuit consisting of a 25 Ω resistor and an 80 μF capacitor in series. Determine (i) an expression for the value of current (ii) the power consumed by the circuit. — 06

a) A 318 μF capacitor is connected across a 230V, 50Hz system. Determine (i) the capacitive reactance, (ii) the r.m.s value of the current (iii) equations for voltage and currents — 06

P.T.O.

c) A capacitor of 79.5 μF is connected in series with a non inductive resistance of 30 Ω across a 100V, 50Hz supply. Find i) impedance ii) current iii) phase angle iv) equations for instantaneous values of voltage and current.

Unit – III

5. a) With neat diagram write the construction and working of an induction type single phase energy meter.

b) A 20 KVA single phase transformer has 1000 primary turns & 2500 secondary turns. The net cross sectional area of the core is 100 sq cm, when the primary winding is connected to 500V, 50Hz supply. Calculate (i) The maximum value of flux density (ii) The voltage induced in the secondary winding, (iii) The primary & secondary full load currents.

c) Derive the numerical relationship between the line and phase values of voltage and current for a balanced 3 phase delta connected load with the relevant connection diagram and vector diagram.

6. a) With neat Circuit diagram explain the construction and working of an moving iron ammeter.

b) Three coils each having a resistance of 20 Ohms and inductive reactance of 15 Ohms are connected in star to a three phase, 400 V, 50 Hz supply. Calculate a) line current b) power factor c) power supplied.

c) What are the different types of losses present in a transformer? What do you mean by efficiency of a transformer?

Unit – IV

7. a) With neat sketch explain the constructional features of a DC generator.

b) A 4 pole, 1500 RPM, dc generator has a lap wound armature, having 32 slots and 8 conductors per slot. If the flux per pole is 0.04Wb, Find the emf induced in the armature. What would be the emf induced, if the winding is wave connected?

c) A 6 pole, 3 phase star connected alternator has an armature with 90 slots and 8 conductors per slot. It revolves at 1000 RPM. The flux per pole being 0.05Wb. Find the line value of emf generated if the distribution factor is 0.97 and pitch factor is 1.

8. a) Explain the principle of operation of a synchronous generator.

b) A 6 pole, lap connected dc series motor with 864 conductors takes a current of 110A at 480V.The armature resistance and series field resistance are 0.18 ohms & 0.02 ohms. The flux per pole is 50mWb.Calculate a) the speed b) Gross torque developed by the armature

c) Draw and explain i) torque v/s armature current and ii) speed v/s armature current characteristic curves of DC shunt motor and series motors.

Unit – V

9. a) Describe the construction and working of a split phase capacitor start induction motor

b) Explain with neat sketch the working of fluorescent lamp.

c) A 3 phase 6 pole, 50 Hz induction motor has a slip of 1% at no load. When operated at full load, the slip is 3 %. Calculate
i) Synchronous speed ii) No load speed iii) Full load speed
iv) Frequency of rotor current at full load

10. a) With neat sketches explain the constructional details of squirrel-cage and phase wound induction motors.

b) With neat connection diagram and working lable brief out the working of 3 way control of lamps.

c) With the neat diagram explain the working of sodium vapour lamp.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester B.E. (Credit System) Degree Examinations

April - May 2015

14EE105 - BASIC ELECTRICAL ENGINEERING

3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

State and illustrate Faraday's laws of electromagnetic induction and Lenz's law. 06

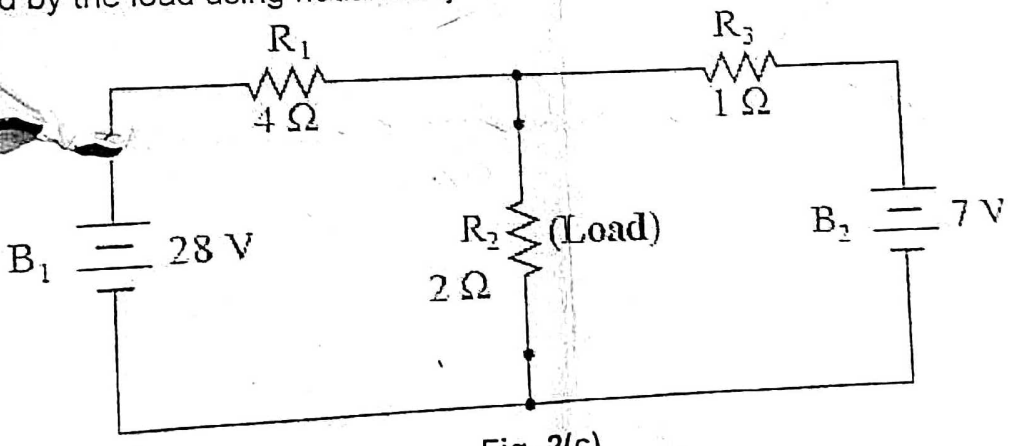
Derive the expression for resistances in the transformation of delta to star network. 06

Coils A and B in a magnetic circuit have 600 and 500 turns. A current of 8A in coil A produces a flux of 0.04Wb. If the coefficient of coupling is 0.2, then find a) self inductance of A with B open circuited. b) Flux linking with coil B c) average emf induced in coil B when the flux with it changes from zero to full value in 0.02 seconds.
d) Mutual inductance \= 08

Derive the expression for the value of dynamically induced emf in a conductor lying in a uniform magnetic field. 06

A Wheatstone bridge ABCD is arranged as follows: - AB=1 ohm, BC=2 ohm, CD=3 ohm, DA=4 ohm, a resistance of 5 ohms is connected between B and D. A 4V battery of internal resistance 1 ohm is connected between A and C. Calculate a) Magnitude and direction of current in 5 ohms. b) Resistance between A and C. 08

In the circuit given in fig 2(c) determine the current supplied by the sources. and power consumed by the load using nodal analysis



06

Fig. 2(c)

Unit – II

Derive an expression for the current and power in a single phase R-L series circuit and also show the related vector diagram and waveforms. 08

A 230V, 50Hz ac supply is applied to a coil of 0.06H inductance & 2.5 Ω resistor, connection is in series with a 6.8 μF capacitor. Calculate i) Impedance, ii) current, iii) power factor iv) power consumed. 06

A capacitor and a resistor are connected in series across a 120V, 50Hz supply. The circuit draws a current of 1.144A. If power loss in the circuit is 130.8W, then find resistance and capacitance. 06

Derive an expression for the average power in a pure resistive circuit energized by sinusoidal voltage. Also show the related diagrams and waveforms. 08

A resistance of 10 Ω, inductive reactance of 8 Ω and a capacitive reactance of 15 Ω are connected in parallel across a 120V, 50Hz mains. Determine i) total current ii) circuit power factor iii) power. 06

P.T.O.

Derive the expression for armature torque developed in a dc motor. 08

Unit – V

Explain the concept of rotating magnetic field in a 3 phase induction motor 06

Why a single phase induction motor is not self starting, explain? 04

What is the necessity of earthing? How it is done? Explain with neat sketch Pipe earthing? 10

A 3 phase induction motor operates from a supply whose frequency is 50 Hz and rotates at a speed of 1485 rpm at no load and 1350 rpm at full load. Find

i) The speed at which the magnetic field of stator is rotating
ii) The slip at no load and at full load
iii) The frequency of the rotor current at no load and full load 08
iv) The frequency of the rotor current at standstill. 04

Explain with the neat diagram the working of 2 way control of lamps. 08

What are the methods of starting a split phase 1 phase Induction motor. Explain any one method with neat sketch.

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c) The airgap in a magnetic circuit is 1.5 mm long and 2500 mm^2 in cross-sectional area. Calculate
   i) the reluctance of the air-gap
   ii) the mmf required to set up a flux of 800 micro-Wb in the air-gap

Unit – II

3. a) With neat waveforms obtain an expression for the average power in a single phase series RC circuit energized by sinusoidal voltage.
   b) A coil having a R= 7 Ω and L = 31.8mH is connected to 230 Volts, 50 Hz supply. Find i) the current through the circuit, ii) phase angle, iii) power factor and iv) power consumed.
   c) A coil of power factor 0.8 is connected in series with a 110 microF capacitor. If the potential difference across the coil is equal to the potential difference across the capacitor, find the resistance and the inductance of the coil. Assume supply frequency to be 50Hz

4. a) Derive the expressions for r.m.s and average values of sinusoidal current.
   b) Two circuits the impedances of which are Z1=(10+j15), Z2=(6-j8) Ohms, are connected in parallel. If the total current supplied is 15A, what is the power taken by each branch? Also find the power factor of individual circuits and of the combination.
   c) An inductive coil is connected to a supply of 250V, 50Hz and takes a current of 5A. The coil dissipates 750W. Find i) power factor, ii) Coil resistance iii) Coil inductance

Unit – III

5. a) Illustrate with neat sketch the working of a Dynamo meter type Watt meter
   b) With neat sketch explain the principle of operation of autotransformer. Mention its advantages.
   c) The power in a three phase circuit is measured by two wattmeters. If the total power is 100 KW and the power factor is 0.66 leading, what will be the readings of each wattmeter? For what power factor, will one of the wattmeters read zero?

6. a) With neat sketch explain the principle of operation of single phase transformer. Derive the transformation ratio of the transformer
   b) A balanced 3 phase star connected load of (8+j6)ohm per phase is connected to a balanced 3 phase 400 V supply. Find the line current , power factor, power and total volt amperes?
   c) Prove that the power in a 3 phase circuit can be measured by using 2 watt meters with the relevant connection diagram and vector diagram in a delta connected system.

Unit – IV

7. a) With usual notations derive the emf equation of a DC generator.
   b) A 200V, 4 pole, lap wound dc shunt motor has 800 conductors on its armature. The armature resistance is 0.5 Ohms and the shunt field resistance is 200 Ohms. The motor takes a current of 21A and the flux per pole is 30mWb. Find the speed and the gross torque developed in the motor.
   c) A 2 pole, 3 phase star connected alternator running at 3000 RPM, has 42 armature slots with 2 conductors in each slot. Find flux per pole required to generate a line voltage of 2300V if the distribution factor is 0.952 and pitch factor is 0.956.

8. a) Explain the principle of operation of a synchronous generator.
   b) A 4 pole, 250V dc series motor has a wave connected armature with 200 conductors. The flux per pole is 25mWb when the motor draws 60A from the supply. The resistances of the armature and field are 0.15 Ohms and 0.2 Ohms respectively. Find the speed under this condition

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First/Second Semester B.E. (Credit System) Degree Examinations

Make up / Supplementary Examinations - July 2015

14EE105 – BASIC ELECTRICAL ENGINEERING

tion: 3 Hours | Max Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

a) State and explain i) Ohm's law and ii) Kirchhoff's laws for an electrical system comprising emf sources and passive impedance elements. 06

b) Determine the current in the 5 ohm resistor by mesh current analysis method for the circuit shown in fig 1(b)

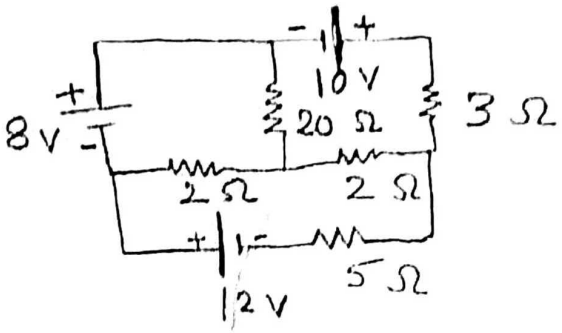

Fig. 1(b) 06

c) Two identical coils A and B consisting of 2000 turns each lie in parallel plane such that 70 % of the flux produced by coil A link the coil B. A current of 4 A flowing in coil A produces in it a flux of 0.06 mWb. Calculate the self inductance of the coil A. If the current in coil A changes from 5A to -5A in 0.01 second, what emf is induced in the coil B. 08

a) Define (i) Flemings right hand rule
(ii) Self inductance
(iii) Mutual inductance 06

b) Find the current in the various branches of the given network shown in fig 2(b)

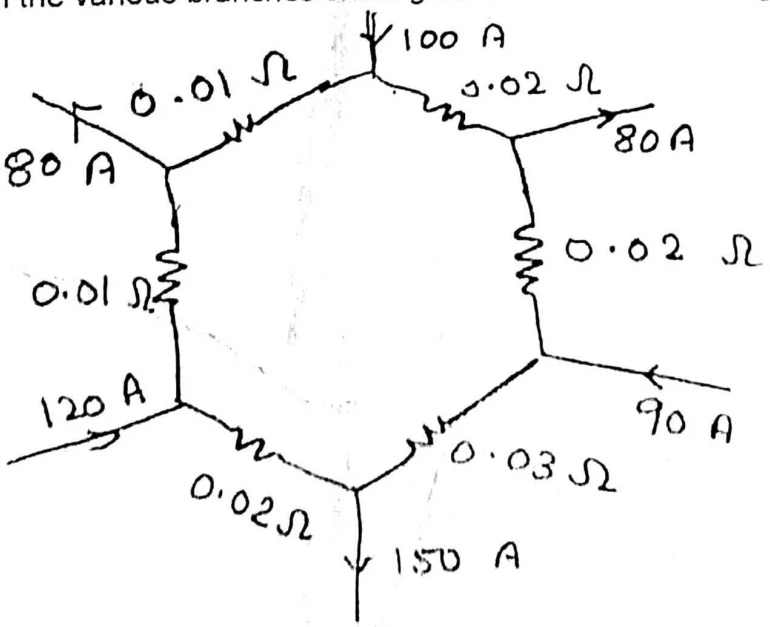

Fig. 2(b) 08

c) Prove that in a pure inductive circuit, the average power supplied to an inductor over a complete cycle is zero. Also draw the phasor diagram.

Unit – III

5. a) With a neat sketch explain the working principle of dynamometer type wattmeter

b) A balanced 3-phase, star connected load of 150 kW takes a leading current of 100A with a line voltage of 1100V, 50Hz. Find the circuit constants of the load per phase

c) The primary winding of a single phase transformer is connected to a 230V, 50Hz supply. The secondary winding has 1000 turns. If the maximum value of the flux is 0.002Wb, Calculate i) the number of turns in the primary, ii) secondary induced voltage and iii) the net cross sectional area if the flux density has a maximum value of 0.45 Wb/m^2

6. a) Explain the principle of operation of a single phase transformer and derive its EMF equation

b) A balanced three phase star connected load draws power from a 440V supply. The two wattmeters connected indicate 4.2 kW and 0.8 kW respectively. Calculate the power, power factor and the current in the circuit

c) Establish the relationship between the line and phase voltages & currents in a 3 phase delta connected system. Draw the phasor diagram.

Unit – IV

7. a) With usual notations derive an expression for the induced EMF of a D.C. Generator.

b) A 4 pole, 500V shunt motor has 720 wave connected conductors on its armature. The full load armature current is 60A, and the flux per pole 0.03wb.The armature resistance is 0.2Ω and the contact drop is 1 volt per brush. Calculate the full load speed of the motor.

c) With a neat sketch describe the working principle of synchronous generator

8. a) A 3 phase 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03wb and speed is 375rpm. Find the frequency and the phase and line EMF if the distribution factor Kd=0.96 and the pitch factor Kp=1

b) Discuss the speed and torque of the series and shunt DC Motors.

c) What is back emf? Explain the significance of back emf.

Unit – V

9. a) With neat diagram explain the construction of 3 phase Induction Motor.

b) A Three phase induction motor is wound for four poles and is supplied from a 50 Hz system. Calculate
i) the synchronous speed: ii) the speed of the rotor when the slip is 4 %
iii) the rotor frequency when the speed of the rotor is 600 r/min.

c) With neat diagram explain Pipe earthing.

10. a) Explain the principle of operation of 3 phase Induction motor.

b) Explain the double field revolving theory of single phase Induction motors.

c) The stator of a 3 phase induction motor has 3 slots/pole/phase, if supply frequency is 50 Hz, calculate number of stator poles produced and total number of slots on stator.
Take speed of rotating magnetic field is 1500 rpm.

BT* Bloom's Taxonomy, L* Level

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester B.E. (Credit System) Degree Examinations

November - December 2015

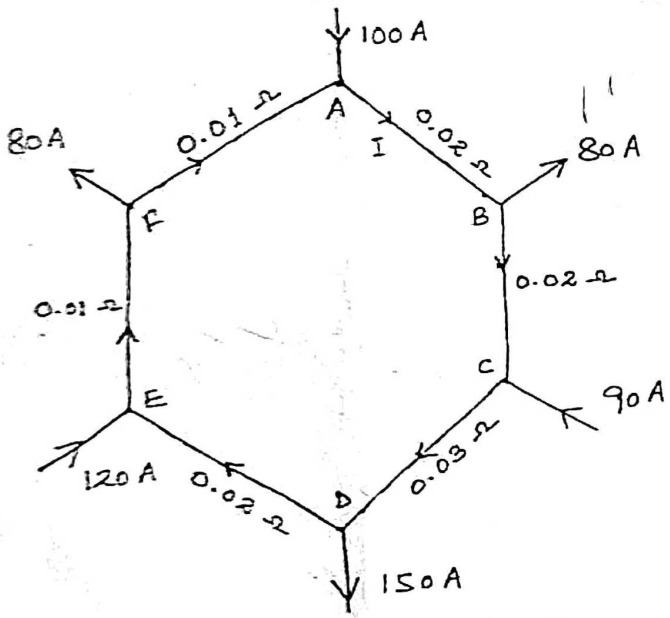
15EE105 – BASIC ELECTRICAL ENGINERRING

ation: 3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from each **Unit**.*

		Marks	BT*
	Unit – I		
a)	Two resistors are connected in Parallel. The voltage applied to this Parallel combination is 200 V, total current taken by the network is 25A, Power dissipated in one of the resistor is 1500 Watts. What is the resistance of each resistor?	4	L*3
b)	Derive an expression for energy stored in an inductor.	8	L2
c)	List the similarities and differences between Magnetic and electric Circuit.	8	L1
a)	Find the current in the various branches of the given network shown in fig. 2 (a).		



b)	Derive an expression for coefficient of coupling related to magnetic flux.	8	L3
c)	State the Faraday's Laws of Electromagnetic induction and Lenz's law.	6	L2
		6	L1
	Unit – II		
a)	Define the following terms with reference to alternating current (i) Average value (ii) RMS value (iii) Peak factor	6	L1
b)	An inductor has a 54Ω reactance at 60Hz. If it is excited by a 100V, 50Hz supply what will be the (i) inductive reactance and (ii) the maximum current?	6	L3
c)	A 15Ω resistor, 0.1H inductor and a 100μF capacitor connected in series when excited by a 50Hz AC supply, drives an RMS current of 10A. Find the voltage drop across (i) the resistor (ii) the inductor (iii) the capacitor and (iv) the RLC combination.	8	L3
a)	A pure resistive circuit is excited by an AC voltage $v=V_m\sin\omega t$. Obtain expressions for instantaneous current, instantaneous power and the average power supplied to the resistor over a complete cycle. Also, draw the phasor diagram.	6	L2
b)	A resistance and a reactance connected in series is excited by a voltage (0+j10) volts driving a current (0.8+j0.6) amperes. Determine the values of resistance and reactance. Also, indicate if the reactance is inductive or capacitive.	6	L3

P.T.O.