4. a) Define and derive the expression for (i) average value (ii) RMS value of an alternating sinusoidal signal. 10
   b) A 100V, 50Hz inductive circuit takes a current of 10A lagging the voltage by 30°. Calculate the resistance and inductance of the circuit. Draw the waveforms of current and voltage. 6
   c) Define power factor and active power in a single phase ac system. 4

Unit – III

5. a) Find relationship between line and phase values of a star connected three phase balanced load with the help of the phasor diagram 7
   b) With a neat diagram explain the working principle of dynamometer type wattmeter. 7
   c) With the neat sketch explain the working principle of single phase transformer. Name the types of transformer relevant to construction. 6
6. a) Each branch of a 3 phase star connected load consists of a coil of resistance 4.2 Ohm and reactance 5.6 Ohm. The load is supplied at a line voltage of 415V, 50Hz. The total power supplied to the load is measured by the two wattmeter method. Find the reading of each of two wattmeter connected to measure the power. 8
   b) With neat diagram explain the construction and working of a moving iron repulsion type voltmeter 6
   c) A 25 kVA single phase transformer has a primary voltage of 2000 volts at 60Hz. The number of primary turns is 500 and secondary turns are 40. Neglecting losses, calculate (i) full load primary and secondary current, (ii) No load secondary emf, iii) maximum flux in the core. 6

Unit – IV

7. a) With usual notations derive an expression for the generated EMF in a D.C. 8
   b) With a neat sketch describe the working principle of synchronous generator. 6
   c) A 4 pole 220 V lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40A from the supply. The field resistance and armature resistances are 110 ohm and 0.1 ohm respectively. The flux per pole is 40mWb. Calculate the speed of the motor. 6
8. a) Discuss the torque versus armature current characteristic and speed versus armature current characteristic of the series and shunt DC Motors. 8
   b) A 4 pole wave connected generator has a useful flux of 0.02 Wb. If the induced EMF is 288 V at 1200 rpm, find the number of conductors in the armature. If each slot contains 10 conductors, find the number of slots on the armature. 6
   c) A 3 phase 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 30mWb. Find the phase and line voltages, if the speed is 375 rpm. The winding factor is 0.96 and and the coil is full pitched. 6

Unit – V

9. a) With neat diagram explain the operation of split phase capacitance start induction motor. Mention its application.
   b) A three phase, 4 pole, 400V, 50 Hz induction motor runs with a slip of 4%. Find the rotor speed and frequency of induced currents.
   c) With neat diagram explain the working of pipe earthing.
10. a) With neat diagram explain the working of sodium vapour lamp.
   b) With neat diagram explain three way control of lamps.
   c) Elaborate on following terminology
      i) Fuse
      ii) Conduit wiring
      iii) Earthing

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

Make up Examinations - January 2017

16EE105 – BASIC ELECTRICAL ENGINEERING

Duration: 3 Hours | Max. Marks: 100

*Note: 1) Answer **Five full** questions choosing **One full** question from **each Unit.***
2) Assume missing data if any.

			Marks	BT*
		Unit – I		
1.	a)	A coil consists of 600 turns and a current of 10A in the coil gives rise to a magnetic flux of 1mw6 Calculate. (i) Self inductance (ii) the emf induced & (iii) Energy stored, when current is reversed in 0.01 seconds.	7	L*3
	b)	Define statically induced emf, dynamically induced emf and coefficient of coupling.	5	L1
	c)	Using Thevenins theorem, find p.d across terminals AB in fig Q 1.C.	8	L3

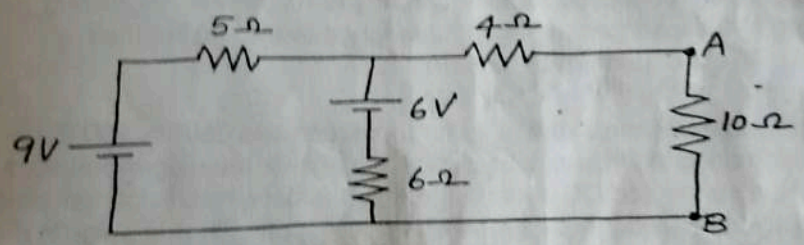

Fig. Q 1(c)

2.	a)	State maximum power transfer theorem.	4	L1
	b)	Coils A and B in a magnetic circuit has 600 and 500 turns respectively. A current of 8A in coil A produces a flux of 0.04 wb. If coefficient of coupling is 0.2 Calculate (i)Self inductance of coil A (ii)Flux linking with coil B (iii)Average emf induced in coil B, when the flux with it changes from zero to full value in 0.02 seconds. (iv) Mutual inductance.	10	L3
	c)	A current of 20A flows through ammeters A and B in series. The potential difference across A is 0.2 V and across B is 0.3 V.Find how the same current will divide between A and B when they are in parallal.	6	L2
		Unit – II		
3.	a)	Obtain an expression for the average power over a complete cycle in a single phase series RL circuit energized by a sinusoidal voltage.	8	L2
	b)	A capacitor of 8μF takes a current of 1A when the alternating voltage applied across it is 250V. Calculate (a) the frequency of the applied voltage (b) the resistance to be connected in series with the capacitor to reduce the current in the circuit to 0.5 A at the same frequency (c) the phase angle of the circuit.	6	L3
	c)	A voltage of 200V is applied to a series circuit consisting of a resistor, inductor and a capacitor. The voltages across these elements are 170V, 150V and 100V respectively .The current drawn is 4 A. Find the power factor of the circuit.	6	L3

P.T.O.

16EE105

Unit – III

5. a) Derive the relationship between line and phase values of a star connected balanced system. Obtain the equation for three phase power.
   b) Explain the principle of operation of single phase transformer.
   c) Three similar coils having a resistance of 10 Ω and a reactance of 8 ohm are connected in star across 400 V, 50 Hz, 3 phase supply. Calculate the line current and total power consumed.

6. a) Prove that two wattmeter are sufficient to measure the power of a three phase balanced Delta connected load.
   b) Explain the construction and principle of single phase induction energy meter.
   c) Three coils are connected in delta to a three phase, three wire, 400V, 50Hz, supply and take a line current of 5A, 0.8 power factor lagging. Calculate the resistance and inductance of the coils.

Unit – IV

7. a) Explain the constructional features of D.C Machines.
   b) Derive the torque equation of DC motor.
   c) A 4 pole wave wound D.C machine armature has 50 slots with 10 conductors per slot. The armature is rotated at 100 rpm. If the flux per pole is 30 mWb, calculate the value of generated emf.

8. a) Derive the emf equation of synchronous generator.
   b) Distinguish between salient pole and non-salient pole alternator.
   c) A three phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 Wb and the speed is 375 rpm. Find the value of generated emf, if the distribution factor is 0.96 and the windings are full pitched.

Unit – V

9. a) Explain the principle of operation of a three phase induction motor.
   b) Explain the methods of starting of a single phase induction motor.
   c) A 3 phase 4 poles, 440 V, 50 Hz induction motor runs with a slip of 4%. Find the rotor speed and frequency of the rotor current.

10. a) Explain the principle of working of a sodium vapor lamp. List its applications.
    b) Explain with a neat connection diagram and working table the two way control of lamps.
    c) Explain the Pipe earthing of an installation. Why it is essential?

BT* Bloom's Taxonomy, L* Level

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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 2017

16EE105 – BASIC ELECTRICAL ENGINEERING

Duration: 3 Hours | Max. Marks: 100

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

Unit – I

			Marks	BT*
1.	a)	State and Explain Ohm's Law. What are its limitations?	6	L*1
	b)	Calculate the equivalent resistance of the network shown in Fig. 1(b) as measured across the terminals A and B.		

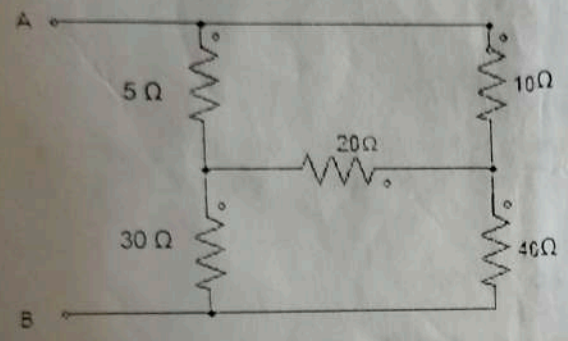

Fig. 1(b)

	c)	State and explain the superposition theorem.	8	L3
2.	a)	State and Explain Faraday's laws of electromagnetic Induction.	6	L1
	b)	Calculate the inductance and energy stored in the magnetic field of air cored solenoid 100 cm long 5 cm in diameter and wound with 1000 turns if it is carrying a current of 10 A.	6	L1
	c)	Find the current through 20 Ω in the circuit shown in Fig. 2(c) using nodal analysis.	6	L3

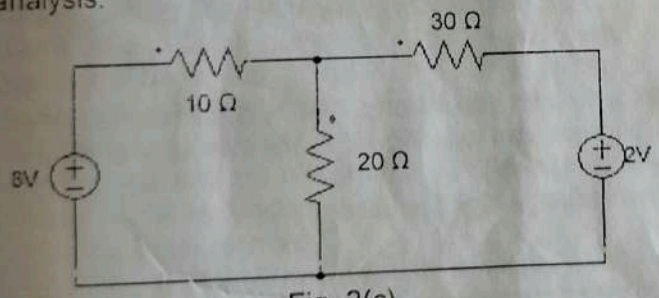

Fig. 2(c)

Unit – II

3.	a)	Derive an expression for rms value, average value and form factor for a sinusoidal varying alternating voltage. Define form factor.	8	L3
	b)	A series R-L circuit takes 160 watts of power at 0.8 power factor lagging from 100 V, 50 Hz supply. Determine the values of R & L.	6	L1
	c)	An alternating current is given by i= 14.14 sin 377t. Find i) rms value of current ii) frequency iii) average value of current iv) form factor and v) instantaneous value of current when t= 3 mS.	6	L3
4.	a)	Define Power factor of an ac circuit. What is its significance?	4	L3
	b)	Prove that power consumed by a pure capacitor is zero.	6	L1
	c)	A series RLC circuit is composed of 100 ohms resistance, 1.0 H inductance and 5 μF capacitance. A voltage v (t) = 141.4 cos 377t volts is applied to the circuit. Determine the current and V_R, V_L and V_C. Find Power consumed by the circuit.	10	L1

P.T.O.

c) Find the value of instantaneous current, voltage and power when a pure inductive circuit is excited by an AC supply. Also, plot the phasor diagram and the waveform. 7

Unit – III

5. a) Deduce the relationship between line and phase voltages in a star connected 3-Φ system. 7

b) An ideal 25 kVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz supply. Calculate (i) primary and secondary currents on full load (ii) secondary e.m.f and (iii) the maximum core flux. 7

c) Prove that two wattmeters are sufficient to measure the balanced star connected 3-Φ load. 6

6. a) With relevant equations obtain the condition for maximum efficiency of a single phase transformer. 6

b) A star-connected alternator supplies a delta connected load. The impedance of the load branch is (8+j6) ohm/phase. The line voltage is 230 V. Determine (i) the current in the load branch (ii) power consumed by the load (iii) power factor of the load and (iv) reactive power of the load. 7

c) With a neat diagram, explain the working principle of attraction type moving iron type instruments and obtain the relationship between deflection θ of a pointer and current. 7

Unit – IV

7. a) Derive an expression for the e.m.f generated in a DC generator. 7

b) A 3-Φ, star-connected alternator on open circuit is required to generate a line voltage of 3600V at 50 Hz when driven at 500 r.p.m. The stator has 3 slots per pole per phase and 10 conductors per slot. Calculate (i) the number of poles and (ii) useful flux per pole. Assume all the conductors per phase to be connected in series and the coils to be full-pitched with K_d=0.96. 7

c) What is the necessity of starters? With neat diagram explain the working of 3 point starter. 6

8. a) With a neat diagram, explain the working principle of a DC motor. 6

b) The armature of a 6-pole, 600 r.p.m. lap-wound generator has 90 slots. If each coil has 4 turns, calculate the flux per pole required to generate an e.m.f of 288 volts. 7

c) Derive the equation for the r.m.s value of voltage induced per phase in an alternator. 7

Unit – V

9. a) Explain the concept of rotating magnetic field when a 3-Φ supply is given to the stator winding of an Induction motor. 7

b) A 3-Φ induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate (i) the synchronous speed (ii) the speed of the motor when slip is 4% and (iii) the rotor current frequency when the motor runs at 600 r.p.m 6

c) With a neat diagram, explain the working principle of fluorescent lamp. 7

10. a) Explain the importance of MCB and fuse in overload protection of appliances. 6

b) Explain the principle of operation of single phase induction motor with permanent capacitor. 7

c) With neat sketch explain the pipe earthing.

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 2017

17EE105 – BASIC ELECTRICAL ENGINEERING

ration: 3 Hours

Max. Marks: 100

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

Unit – I

		Marks	BT*
a)	Derive an expression for star (y) – delta (Δ)transformation.	6	L*2
b)	In the network shown in figure below, find the magnitude and direction of each branch current by mesh current method.		

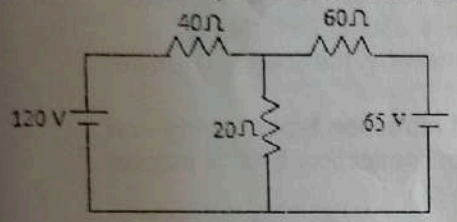

Fig 1(b)

c)	Derive an expression to find the amount of energy stored in the magnetic field.	7	L3
a)	State and explain Faradays laws of electromagnetic induction.	7	L2
b)	Find the value of currents in the various branches of the circuit shown in figure by nodal analysis.	6	L2

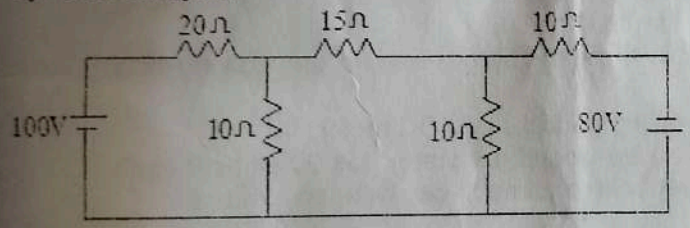

Fig 2.b

c)	Derive an expression to find lifting power of a magnet.	7	L3
		7	L2

Unit – II

a)	Find the value of instantaneous value of current, voltage and average power when a series combination of resistance and inductance circuit is excited by an AC supply. Also, plot the phasor diagram and the waveform.	7	L2
b)	Define the terms i) Phase, ii) Phase difference, iii) r.m.s value, iv) form factor, v) Peak factor, vi) Average value.	6	L1
c)	An impedance of Z_1= (8-j5) Ω is in parallel with an impedance of Z_2= (3+j7) Ω. If 100 V AC is impressed on the parallel combination, find the branch currents , resultant current, voltage drop across each parameter, equivalent resistance, reactance and impedance of the whole circuit .	7	L3
a)	Explain phase of an alternating voltage.	5	L2
b)	A resistance of 20Ω, an inductance of 0.2 H and a capacitance of 100 μF are connected in series across 220V, 50 Hz mains. Determine (i) the impedance (ii) current (iii) voltage across R, L and C (iv) power (v) power factor and (vi) phase angle.	8	L3

P.T.O.