4. a) Define i) cycle ii) maximum value iii) form factor iv) frequency v) average value — 06
   b) Starting from fundamentals, show that average power in a R-C circuit excited by sinusoidal current $I_m \sin(wt)$ is VI $\cos\Phi$, where V and I are rms value of voltage and current and Φ is the phase angle between voltage and current. — 07
   c) A capacitor of capacitance 79.5μF is connected in series with a pure resistance of 60Ω across a 200V, 50Hz supply. Find impedence, current, phase angle and equation for instantaneous value of current. — 07

Unit – III

5. a) A balanced star connected load is supplied from a balanced three phase 400V, 50Hz system. The current in each phase is 30A and lags the supply voltage by 30°. Find the total power, phase voltage and circuit elements. — 06
   b) List and explain the various losses in a transformer. — 07
   c) With neat Circuit diagram explain the construction and working of an induction type instrument. — 07

6. a) With neat phasor representation and circuit diagrams, show that two wattmeters are sufficient to measure power in a three phase balance load. — 07
   b) A 200kVA, 3300/240V, 50Hz single phase transformer has 80 turns on the secondary winding. Calculate a) primary and secondary current, maximum value of flux and number of primary turns. — 07
   c) Explain with the help of a neat diagram the construction of attraction type moving iron instrument. — 06

Unit – IV

7. a) Discuss with a neat sketch the construction features of a DC machine clearly mentioning all its parts. — 07
   b) A 4 pole generator with wave wound armature has 51 slots, each having 24 conductors. The flux per pole is 0.01 Webers. At what speed must the armature rotate to induce an emf of 220V? What will be the voltage developed and speed of the armature if the winding is lap? — 06
   c) Derive the emf equation of a synchronous generator. — 07

8. a) With a neat sketch discuss the characteristics of a DC shunt motor. — 07
   b) 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 speed is 375 rpm. Find the frequency and the emf generated per phase if winding factor is 0.96 and pitch factor is 1. — 06
   c) With a neat sketch explain the operation of a three point starter. — 07

Unit – V

9. a) Explain the concept of rotating magnetic field in an induction machine. — 07
   b) A three phase, 6 pole, 50 Hz induction machine has a slip of 3%. Find synchronous speed, full load speed and frequency of rotor current at full load. — 06
   c) Sketch the construction and explain principle of fluorescent lamp. — 07

10. a) With a neat sketch explain star delta starter of an induction machine. — 07
    b) With a neat circuit diagram discuss the principle of operation of single-phase induction motor with permanent capacitor. — 07
    c) Discuss the operation of two way control of lamp. — 06

BT* Bloom's Taxonomy, L* Level

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USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

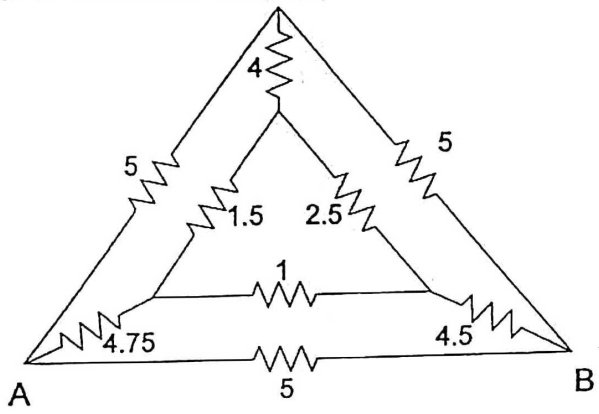
Second Semester B.E. (Credit System) Degree Examinations

April - May 2018

17EE105 – BASIC ELECTRICAL ENGINEERING

ion: 3 Hours | Max. Marks: 100

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

		Marks	BT*
	Unit – I		
a)	State and explain the following: i) Flemings left hand rule ii) Self induced emf iii) Ohms law and its limitations	06	L*1
b)	In the network shown Fig. 1(b) find the resistance between the points A and B using star-delta transformations. All resistances are in ohms.		
	 Fig. 1(b)	07	L3
c)	A ferromagnetic ring of cross sectional area 800mm^2 and mean radius of 170mm has two winding connected in series one of 500 turns and another of 700 turns. If the relative permeability is 1200, calculate self-inductance of each coil and mutual inductance of each coil assuming there is no flux leakage.	07	L3
d)	Derive an expression for the energy stored in a magnetic field.	06	L2
e)	Two batteries A and B are connected in parallel to supply a load of 0.3Ω. The open circuit voltage of A is 11.7V and that of B is 12.3V. The internal resistances are 0.06Ω and 0.05Ω respectively. Find the voltage drop across the load and the current supplied to the load.	07	L3
f)	The effective resistance of two resistors connected in parallel is 8Ω. The resistance of one of the resistor is 12Ω. Calculate i) Resistance of the other resistor ii) Effective resistance of the two resistors connected in series iii) If the voltage across the parallel combination is 24V. Find the current flowing through individual resistors.	07	L3
	Unit – II		
i)	Derive an expression for the rms value of a sinusoidally varying current.	06	L2
j)	Two impedances Z1=(6-j8)Ω and Z2=(16+j12)Ω are connected in parallel. If the total current in the combination is (20+j10)A. Find i) voltage across the combination ii) current in the two branches iii) draw the phasor diagram	07	L3
k)	A resistance R, inductance L=0.2H and a capacitance C are connected in series. When an alternating voltage v= 400 √2 sin(314t-20°) is applied to series combination, the current flowing is 10√2 sin (314t-65°). Find the values of resistor and capacitor.	07	L3

P.T.O.

17EE105

c) A single phase voltage of (200+j0) V at 50Hz is applied to a circuit comprising of a resistance of 20Ω, inductance of 20mH and a capacitance of 150μF connected in series. Find, (i) Impedance of the circuit (ii) current drawn from supply (iii) power factor (iv) power drawn (v) energy stored in inductor and capacitor. 8

Unit – III

5. a) Establish the relationship between line and phase voltages and currents in a 3 phase balanced delta connected system. Show the vector diagram neatly. 8
   b) Derive the emf equation of a single phase transformer. 6
   c) A balanced star connected load of (8+j6) Ω per phase is connected to a three phase, 230V supply. Find the line current, power factor, power and reactive volt ampere. 6

6. a) With a neat circuit diagram and phasor diagram, show that two wattmeters are sufficient to measure power in a 3 phase balanced star connected circuit. 8
   b) The maximum efficiency at full load and unity power factor of a single phase 25KVA, 500/1000 V, 50Hz, transformer is 98%. Determine its efficiency at 75% load, 0.9pf. 6
   c) With the help of neat diagram, explain the construction of a single phase induction energy meter. 6

Unit – IV

7. a) Derive the expression for armature torque developed in a DC motor. 8
   b) A 4 pole DC shunt motor takes 22A from 220V supply. The armature and field resistances are respectively 0.5Ω and 100 Ω. The armature is lap connected with 300 conductors. If the flux per pole is 20mWb, calculate the speed & gross torque. 6
   c) Distinguish between salient and non salient type of alternator rotors. 6

8. a) With usual notations, derive the emf equation of a DC generator. 8
   b) Derive an equation for the frequency of the induced emf in an alternator. 6
   c) A 12 pole, 500 rpm, star connected alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02wb and is distributed sinusoidally. The winding factor is 0.97 and pitch factor is 0.98. Calculate the line emf. 6

Unit – V

9. a) With neat diagrams explain different types of rotor used in Induction motor. State its advantages, disadvantages and applications. 8
   b) With a circuit diagram, explain the working of a two way control of lamp. 6
   c) Write short note on fuse. 6

10. a) Define slip of an Induction motor and derive the relation between the supply frequency and rotor current frequency. 6
    b) A 3 phase, 4 pole, 400V, 50Hz Induction motor runs with a slip of 4%. Find the rotor speed and frequency.
    c) With a neat diagram, explain plate earthing.

* Bloom's Taxonomy, L* Level

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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

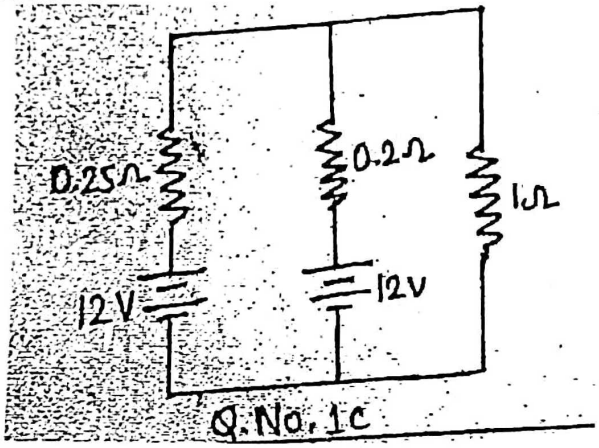
Make up/Supplementary Examinations – July 2018

17EE105 – BASIC ELECTRICAL ENGINEERING

uration: 3 Hours | Max. Marks: 100

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

		Marks	BT*
	Unit – I		
1. a)	State and explain Ohm's Law. What are its limitations?	6	L*2
b)	A circuit consists of two parallel resistors having resistance of 20Ω and 30Ω respectively connected in series with 15Ω. If the current through 15Ω resistor is 3A, find (i) current in 20Ω and 30Ω resistors (ii) the voltage across the whole circuit (iii) the total power and power consumed in all resistors.	8	L3
c)	For the circuit shown, find the current supplied by each battery and power dissipated in 1Ω resistor.		



Q.No. 1c

		6	L3
a)	Derive an expression for the energy stored in an inductive coil.	6	L4
b)	Coils A and B in a magnetic circuit have 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 with B open circuited. (ii) flux linking with coil B (iii) the average emf induced in coil B when the flux with it changes from zero to full value in 0.02 sec.	8	L3
c)	State and explain Faraday's laws of electromagnetic induction.	6	L2
	Unit – II		
a)	Show that a pure inductance does not consume any power. Draw the relevant waveforms.	8	L2
b)	Two impedances $Z_1 = (10+j15)\Omega$ and $Z_2=(5-j8)\Omega$ are connected in parallel across a voltage source. If the total current is 10A, calculate currents in Z_1 and Z_2 and power factor of the circuit.	6	L3
c)	Derive the equation for effective value and average value of a sinusoidally varying alternating current.	6	L2
a)	Derive an equation for power consumed by an R-C series circuit.	6	L2
b)	An inductive coil is connected to supply of 250 V at 50 Hz and takes a current of 5A. The coil dissipates 750W. Calculate power factor, resistance and inductance of the coil.	6	L3

P.T.O.

	c)	A voltage e(t) = 100 sin 314 t is applied to series circuit consisting of 10 ohm resistance, 0.0318 henry inductance and a capacitor of 63.6 μF. Calculate (i) Expression for i (t) (ii) Phase angle between voltage and current (iii) Power factor (iv) Active power consumed.	07	L3	2
		Unit – II			
4.	a)	With neat diagram, explain the working principle of transformer.	06	L2	3
	b)	Explain the different losses occurring in transformers when it is energized by AC source.	07	L2	3
	c)	A 25 kVA, single-phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500-volt, 50 Hz mains. Calculate (i) Primary and Secondary currents on full-load, (ii) Secondary e.m.f. (iii) Maximum flux in the core	07	L3	3
5.	a)	With neat diagram, explain the operating principle of DC generator.	07	L2	4
	b)	Explain the Significance of the Back e.m.f. in DC machines and write the expression for it.	06	L2	4
	c)	Explain N/I_a and N/T_a Characteristics of DC shunt and series motors.	07	L2	4
6.	a)	Derive the expression for EMF generated in Synchronous machines.	07	L3	4
	b)	Explain the operating principle of Synchronous Motors.	06	L2	4
	c)	A 3-phase, 16-pole synchronous generator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.04 wb and the speed is 375 rpm. Find the frequency and phase emf and line emf. The total turns/phase may be assumed to be series connected.	07	L3	4
		Unit – III			
7.	a)	Show that the resultant magnetic field is 1.5 times the maximum value of flux produced by individual phases in 3 phase Induction motor.	07	L5	5
	b)	Explain the operating principle of single phase Induction motor.	06	L2	5
	c)	Explain the necessity of Starter's for Induction Motors.	07	L2	5
8.	a)	With a neat diagram, explain 2-way and 3-way control of lamps.	06	L2	5
	b)	What is meant by grounding? With a neat diagram explain plate earthing.	07	L2	5
	c)	Explain the importance of Fuse and MCB in domestic wiring.	07	L2	5

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

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

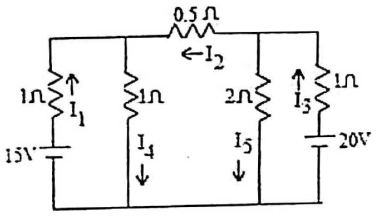
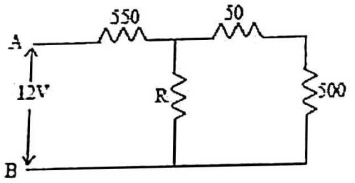
November - December 2018

18EE104 – BASIC ELECTRICAL ENGINEERING

ration: 3 Hours

Max. Marks: 100

Note: *Answer **Five full** questions choosing **Two full** questions from **Unit – I** and **Unit – II** each and **One full** question from **Unit – III**.*

		Marks	BT*	CO*	PO*
	Unit – I				
a)	State and explain KCL and KVL.	06	L*2	1	1,2
b)	Find the values of currents I_1, I_2, I_3, I_4, and I_5 passing in the passive elements by Nodal Analysis method for the network shown in figure. 	07	L3	1	1,2
c)	What is the value of the unknown resistor R in figure if the voltage drop across the 500 Ω resistor is 2.5 volts? All resistances are in ohms. 	07	L3	1	1,2
a)	Explain the terms Average value, RMS value, Form factor, Peak factor of sinusoidally varying voltage and current.	06	L2	2	1,2
b)	Explain how sinusoidal voltage can be generated and obtain equations for Alternating Voltage and Current.	06	L3	2	1,2
c)	The maximum values of the alternating voltage and current are 400 V and 20 A respectively in a circuit connected to 50 Hz supply and these quantities are sinusoidal. The instantaneous values of the voltage and current are 283 V and 10 A respectively at t = 0 both increasing positively. (i) Write down the expression for voltage and current at time t. (ii) Determine the power consumed in the circuit.	08	L3	2	1,2,7
a)	Phase voltage and current of a star-connected inductive load is 150 V and 25 A. Power factor of load is 0.707 (lag). Assuming that the system is 3-wire and power is measured using two wattmeters, find the readings of wattmeters.	06	L3	2	1,2
b)	Deduce the relationship between Voltages and currents in Star connected 3 Phase network and draw the phasor diagram.	07	L3	2	1,2

P.T.O.