ADICHUNCHANAGIRI UNIVERSITY

18ELE13/23

First Semester BE Degree Examination January 2020
(CBCS Scheme)

Time: 3 Hours Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004/60014

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module.
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1 a State Kirchhoff's laws and Explain with an example 6 marks

b A current of 20A flows through the two resistances R1 and R2 which are in series. The potential difference across R1 is 0.2V and across R2 is 0.3V. Find the value of current will divide between R1 and R2 when they are parallel? 7 marks

c Determine all the branch currents for the network shown below. 7 marks

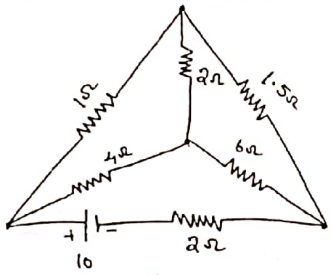

Fig. 1. c

Or

2 a Show that the average power consumed by pure inductor is zero with relevant circuit and wave forms 6 marks

b Two branches, the impedances of which are given by Z1 = (10+j15) Ω, Z2 = (6-j8) Ω are connected in parallel, when a current of 15A is flowing. What is the power in each branch? 7 marks

c Derive an equation for the average value of sinusoidal current. 7 marks

Module – 2

3 a Derive the relation between Line voltage and phase voltage , Line current and phase Current of 3-phase load with neat circuit and phasor diagram. 6 marks

b An inductor coil is connected to supply of 250V at 50 Hz and takes a current of 5A. The coil dissipates 750W. Calculate power factor, resistance and inductance of the coil. 7 marks

c Three coils each of impedance $20\angle 60^0\ \Omega$ are connected in star across a 400V, three phase 50Hz ac supply. Calculate line current and total power. 7 marks

Or

4 a Show that two Wattmeters are sufficient to measure 3-phase power with neat circuit and phasor diagram. 6 marks

b 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. 7 marks

PTO

c Show that current leads in a purely capacitive circuit. 7 marks

Module – 3

5 a Derive an EMF equation of Transformer. 6 marks

b Name two types of earthing .Explain pipe earthing. 7 marks

c A 250KVA, 11000/415V, 50HZ single phase transformer has 80 turns on the secondary. Calculate (i) the rated primary and secondary turns (ii) the number of primary turns (iii) the maximum value of flux (iv) voltage induced per turn . 7 marks

Or

6 a Explain three way and Two way control of lamps with neat diagram . 6 marks

b Define efficiency and hence derive the condition for maximum efficiency. 7 marks

c The maximum efficiency at full load and UPF of a single phase, 25 KVA, 500/1000V, 50HZ transformer is 98%. Determine its efficiency at (i) 75% of full load, 0.9 PF (ii) 50% of full load, 0.8 PF 7 marks

Module – 4

7 a A 4 pole lap connected DC generator has 600 armature conductors and runs at 1200 rpm. The generator has total flux of 0.24 Wb. Calculate the EMF induced. Find the speed at which it should be driven to produce the same EMF when wave connected. 6 marks

b Derive an expression for torque developed in a DC Motor 7 marks

c The field current in a dc shunt machine is 2A and the line current is 20A at 200V. 7 marks
Calculate i) The generated EMF when working as generator
ii) Torque in Nm when running at 1500 rpm as motor.
Take armature resistance as 0.5Ω.

Or

8 a A 500V shunt motor has 4 poles and a wave connected winding with 492 conductors. The flux per pole is 0.05 wb. The full load current is 20 amps. The armature and shunt field resistances are 0.1Ω and 250 Ω respectively. Calculate the speed and the developed torque 8 marks

b Derive an EMF equation of DC Generator 8 marks

c Mention the applications of DC motors. 4 marks

Module – 5

9 a The frequency of the voltage applied to a 4 pole induction motor is 50Hz and that of the rotor induced emf is 1.5 Hz. What is the slip and at what speed the motor is running? 6 marks

b Derive an EMF equation of Synchronous Generator 7 marks

c A three phase induction motor has 6 poles and runs at 960 rpm on full load. It is supplied from an alternator having 4 poles and running at 1500 rpm. Calculate the full load slip and the frequency of the rotor current of the induction motor 7 marks

Or

10 a What is the necessity of Starter in induction motor? Explain Star –Delta starter with neat diagram. 6 marks

b Explain the concept of a rotating magnetic field in induction motor. 7 marks

c The stator of a 3-phase, 6 pole, 1200 rpm alternator has 48 slots, each of which contains 12 conductors. The flux/pole is 0. 3Wb. Calculate the the emf induced in the armature. Assume full pitch coils and winding distribution factor of 0.95. 7 marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

Module-1

1 a State and explain Ohms and mention any two limitations — 6 Marks

b A portion of the network is shown in Fig 1(b) with the polarities as indicated. The voltage across the 15Ω resistor if 30V. find the value of resistance R and the current I. — 8 Marks

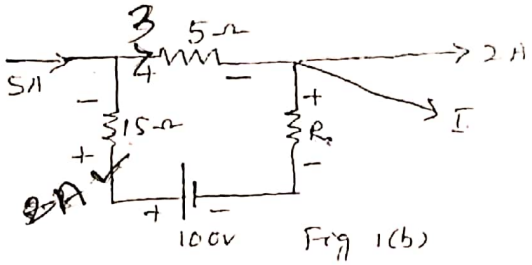

Fig 1(b)

c Define RMS value of an alternating quantity and derive the expression for the same. — 6 Marks

OR

2 a In the network shown in Fig2(a), find the Voltages Vae, Vec, Vac and Vad — 6 Marks

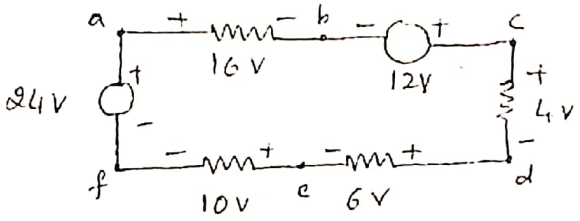

Fig 2.(a)

b Determine the current in all branches of the network shown in Fig2(c). — 8 Marks

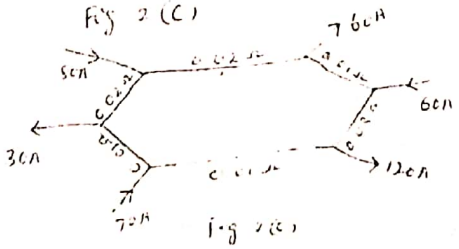

Fig 2(c)

c Define average value of an AC quantity and derive the expression for the same. — 6 Marks

Module-2

3 a With circuit diagram and wave forms show that the average power is zero in pure resistance. 6 Marks

b With circuit diagram and Phasor diagram derive the expression for Line Voltage and Current for a Star connected balanced load. 8 Marks

c A balanced Star connected load of $(8 + j6)\ \Omega$|phase is connected to a 3-phase, 230V supply. Find the line current, powerfactor, active power and reactive power. 6 Marks

OR

4 a Show that the average power demand is never zero in case of series RL circuit with relevant circuit and waveforms. 6 Marks

b Show that two wattmeters are sufficient to measure 3-phase power with relevant circuit and phasor diagram. 8 Marks

c Three similar coils are connected in star takes a total power of 1.5kw at a p.f of 0.2 lagging from a 3-Θ, 00v, 50Hz supply. Determine the parameters of the circuit. 6 Marks

Module-3

5 a Explain the constructional features of various types of transformers. 8 Marks

b A 400|230v, 50Hz single phase transformer is provided with 500 turns on LV side. Calculate 4 Marks

(I) No. of turns on the HV side

(II) Effective area of cross section of the core of the flux density to be less than $1.4 wb/m^2$

c What do you mean by Electric Shock? With neat diagram, explain the pipe earthing? 8 Marks

OR

6 a Derive the condition for maximum efficiency for a transform 6 Marks

b A single phase 20KVA transformer has 1000 primary and 2500 secondary turns. The net cross sectional area in 100 cm^2. When the primary winding is connected to 500V, 50Hz supply. Calculate the following 6 Marks

(I) The maximum value of flux density

(II) The secondary induced voltage

(III) Primary and secondary full load currents

c With circuit diagram and truth table. Explain the operation of three way control of lamps 8 Marks

Module-4

7	a	Derive the EMF equation of a DC generators	6 Marks
	b	Explain the various characteristics of a DC shunt motor	8 Marks
	c	A 4 pole DC Shunt motor tales22.5A from a 250V supply. The armature resistance is 0.5Ω and shunt field resistance in 125Ω. The armature is wave wound with 300 conductors. If the flux/pole is 0.02wbs. Calculate (I) Speed (II) Torque developed and (III) power developed.	6 Marks

OR

8	a	What is a dc generator? What is the basic principle on which it is working? Give the classification of DC generators.	6 Marks
	b	Explain the various characteristics of series motor with relevant diagrams.	8 Marks
	c	A series motor runs at 600rpm when taking a current of 110A from a 230V supply. Given that R_a=012Ω, R_{se}= 0.03Ω. the useful flux/pole for 110A is 0.024wb and that for 50A is 0.0144wbs. Calculate the speed when the current has fallen to 50A.	6 Marks

Module-5

9	a	Explain the constructional features of various types of synchronous generators.	8 Marks
	b	What is an IM? Explain the principle of operation	6 Marks
	c	A 3 phase IM is wound for 8 poles if the full load slip is 2.5%. Calculate (I) Synchronous speed (II) Slip Speed (III) Rotor speed (IV) Rotor frequency	6 Marks

OR

10	a	With usual notations, derive an expression for the induced voltage for a synchronous generator	6 Marks
	b	What is a slip? Explain its significance	6 Marks
	c	An 8 pole alternator runs at 750 rpm and supplies power to a 6 pole IM which has a full load slip of 3%. Find the full load speed of the motor and frequency of rotor emf.	8 Marks

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ADICHUNCHANAGIRI UNIVERSITY

18ELE13/23

First Semester BE Degree Examination January 2020
(CBCS Scheme)

Time: 3 Hours Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004/60014

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module.
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1 a State Kirchhoff's laws and Explain with an example — 6 marks

b A current of 20A flows through the two resistances R1 and R2 which are in series. The potential difference across R1 is 0.2V and across R2 is 0.3V. Find the value of current will divide between R1 and R2 when they are parallel? — 7 marks

c Determine all the branch currents for the network shown below. — 7 marks

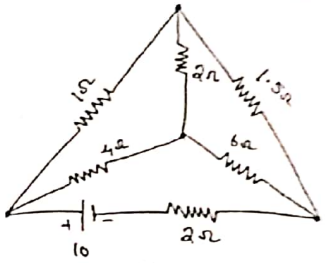

Fig. 1. c

Or

2 a Show that the average power consumed by pure inductor is zero with relevant circuit and wave forms — 6 marks

b Two branches, the impedances of which are given by Z1 = (10+j15) Ω, Z2 = (6-j8) Ω are connected in parallel, when a current of 15A is flowing. What is the power in each branch? — 7 marks

c Derive an equation for the average value of sinusoidal current. — 7 marks

Module – 2

3 a Derive the relation between Line voltage and phase voltage , Line current and phase Current of 3-phase load with neat circuit and phasor diagram. — 6 marks

b An inductor coil is connected to supply of 250V at 50 Hz and takes a current of 5A. The coil dissipates 750W. Calculate power factor, resistance and inductance of the coil. — 7 marks

c Three coils each of impedance $20\angle 60^0\ \Omega$ are connected in star across a 400V, three phase 50Hz ac supply. Calculate line current and total power. — 7 marks

Or

4 a Show that two Wattmeters are sufficient to measure 3-phase power with neat circuit and phasor diagram. — 6 marks

b 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. — 7 marks

PTO

		c	Show that current leads in a purely capacitive circuit.	7 marks

Module – 3

5	a		Derive an EMF equation of Transformer.	6 marks
	b		Name two types of earthing .Explain pipe earthing.	7 marks
	c		A 250KVA, 11000/415V, 50HZ single phase transformer has 80 turns on the secondary. Calculate (i) the rated primary and secondary turns (ii) the number of primary turns (iii) the maximum value of flux (iv) voltage induced per turn .	7 marks

Or

6	a		Explain three way and Two way control of lamps with neat diagram .	6 marks
	b		Define efficiency and hence derive the condition for maximum efficiency.	7 marks
	c		The maximum efficiency at full load and UPF of a single phase, 25 KVA, 500/1000V, 50HZ transformer is 98%. Determine its efficiency at (i) 75% of full load, 0.9 PF (ii) 50% of full load, 0.8 PF	7 marks

Module – 4

7	a		A 4 pole lap connected DC generator has 600 armature conductors and runs at 1200 rpm. The generator has total flux of 0.24 Wb. Calculate the EMF induced. Find the speed at which it should be driven to produce the same EMF when wave connected.	6 marks
	b		Derive an expression for torque developed in a DC Motor	7 marks
	c		The field current in a dc shunt machine is 2A and the line current is 20A at 200V. Calculate i) The generated EMF when working as generator ii) Torque in Nm when running at 1500 rpm as motor. Take armature resistance as 0.5Ω.	7 marks

Or

8	a		A 500V shunt motor has 4 poles and a wave connected winding with 492 conductors. The flux per pole is 0.05 wb. The full load current is 20 amps. The armature and shunt field resistances are 0.1Ω and 250 Ω respectively. Calculate the speed and the developed torque	8 marks
	b		Derive an EMF equation of DC Generator.	8 marks
	c		Mention the applications of DC motors.	4 marks

Module – 5

9	a		The frequency of the voltage applied to a 4 pole induction motor is 50Hz and that of the rotor induced emf is 1.5 Hz. What is the slip and at what speed the motor is running?	6 marks
	b		Derive an EMF equation of Synchronous Generator.	7 marks
	c		A three phase induction motor has 6 poles and runs at 960 rpm on full load. It is supplied from an alternator having 4 poles and running at 1500 rpm. Calculate the full load slip and the frequency of the rotor current of the induction motor	7 marks

Or

10	a		What is the necessity of Starter in induction motor? Explain Star –Delta starter with neat diagram.	6 marks
	b		Explain the concept of a rotating magnetic field in induction motor.	7 marks
	c		The stator of a 3-phase, 6 pole, 1200 rpm alternator has 48 slots, each of which contains 12 conductors. The flux/pole is 0. 3Wb. Calculate the the emf induced in the armature. Assume full pitch coils and winding distribution factor of 0.95.	7 marks

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SRI SAIRAM COLLEGE OF ENGINEERING.

CBCS SCHEME

USN | 1 | S | B | 1 | 7 | C | S | 0 | 5 | 1 | 17ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. State and explain Kirchoff's laws with an example. (07 Marks)

b. For the bridge circuit shown in Fig.Q1(b), calculate current in all the branches and power supplied by the source. (08 Marks)

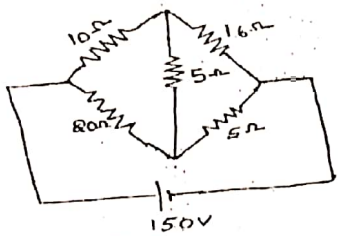

Fig.Q1(b)

c. The winding of an electromagnet is wound with 96 turns and has resistance of 50 Ω. The exciting voltage is 250 volts, and the flux linking coil is 5 mWb. Find the energy stored in magnetic field. If the current is reversed in 0.1 sec. what emf is induced in the coil? (05 Marks)

OR

2 a. State and explain Ohm's law and also list out its limitations. (06 Marks)

b. Define co-efficient of coupling and its relation with L_1, L_2 and M. (06 Marks)

c. Find the currents in various branches of the given network shown in the Fig.Q2(c).

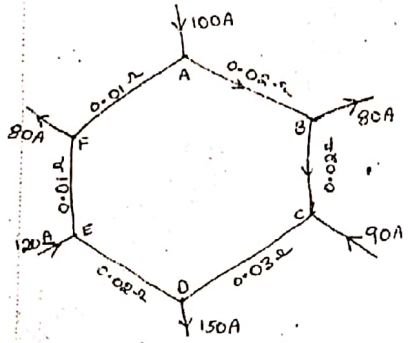

Fig.Q2(c) (08 Marks)

Module-2

3 a. Derive emf equation of D.C. generator. (07 Marks)

b. With the neat diagram explain the construction and working of dynamometer type wattmeter. (07 Marks)

c. A 4 pole lap connected DC generator has 600 armature conductors and runs at 1200 rpm. The generator has flux per pole is 0.06 Wb. Calculate emf induced. Find the speed at which it should be driven to produce the same emf when wave connected. (06 Marks)

OR

4 a. Derive the expression for armature torque. (08 Marks)

b. With the neat diagram explain the construction and working of induction type energy meter. (08 Marks)

c. List the applications of shunt and series motor. (04 Marks)

Module-3

5 a. Derive average value of sinusoidal voltage in terms of its maximum value. (06 Marks)

b. With the sketch explain the working of three way control of lamp. (06 Marks)

c. A voltage e = 100 sin 314t is applied to circuit consisting of 80 μF capacitor in series with 25 Ω resistor. Determine current and power factor in the circuit and also find voltage across the capacitor when current is half of its maximum value. (08 Marks)

OR

6 a. Show that power consumed by the pure capacitor is zero. Draw the voltage, current and power wave form. (06 Marks)

b. Write a short note on :
(i) Necessity of earthing (ii) Precaution to be taken to prevent electric shock. (07 Marks)

c. A circuit consists of a resistance 10 Ω an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V, 50 Hz is applied to the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram. (07 Marks)

Module-4

7 a In 3ϕ star connection find the relation between line and phase values of current and voltage and also derive equation for 3ϕ power. (08 Marks)

b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. (06 Marks)

c. Two wattmeters are connected to measure the input to a 3ϕ, 20 HP, 50 Hz induction motor that works at full load efficiency of 90% and the power factor of 0.85 lagging. Find the readings of two wattmeter. (06 Marks)

OR

8 a. Show that the 2 wattmeter are sufficient to measure 3ϕ power. (08 Marks)

b. A 3ϕ 6 pole star connected alternator has an armature with 90 slots and 12 conductors per slot. It revolves at 1000 rpm. the flux per pole being 0.05 Wb, calculate the line value of the emf generated. If distribution factor 0.96 and pitch factor is 0.97. (06 Marks)

c. A balanced star connected load of (8 + j6) per phase is connected to a 3ϕ, 230 V supply. Find the line current, power factor, reactive power and total volt amperes. (06 Marks)

Module-5

9 a. Derive emf equation of a transformer. (06 Marks)

b. A 3ϕ induction motor with 4 poles is supplied from the alternator having 6 poles running at 1000 rpm. Calculate synchronous speed of the induction motor, its speed when slip is 0.04 and frequency of the rotor emf when the speed is 600 rpm. (08 Marks)

c. Derive the condition for which the efficiency of a transformer is maximum. (06 Marks)

OR

10 a. Explain with diagrams the concept of rotating magnetic field in three phase induction motor. (08 Marks)

b. A 500 kVA transformer has an efficiency of 92% at full load upf and at half full load 0.9 P.f. Determine its efficiency at 80% of full load and 0.95 P.f. (06 Marks)

c. A 3ϕ, 50Hz, 6 pole induction motor has a full load percentage slip of 3% find synchronous speed and actual speed. (06 Marks)

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SRI SAIRAM COLLEGE OF ENGINEERING

CBCS SCHEME

USN | | | | | | | | | | |

15ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. State and explain ohm's law, mention its limitations. (05 Marks)

b. Define the coefficient of coupling and find its relation with L_1, L_2 and M. (05 Marks)

c. A current of 30A flows through two ammeters A_1 and A_2 connected in series. The potential differences across the two ammeters are 0.3V and 0.6V respectively. Find how the same current will divide when they are connected in parallel. (06 Marks)

OR

2 a. Derive an expression for energy stored in the magnetic field. (05 Marks)

b. State and explain Kirchhoff's Laws. (05 Marks)

c. A coil of 1000 turns is wound on a silicon steel ring having μ_r of 1200. The ring has a mean diameter of 10cm and cross sectional area of 12 Sq.cm. when a current of 4A flows through the coil find :

i) Flux is the core
ii) Inductance of the coil
iii) The e.m.f induced in the coil. If the flux falls to zero in 15ms and
iv) Now, if another similar coil is placed such that 70% magnetic coupling exists between the coils, find the mutual inductance. (06 Marks)

Module-2

3 a. Explain with neat sketch the constructional features of a D.C. Generator and mention the function of each part. (05 Marks)

b. With the help of neat diagram, explain the construction and working principles of dynamometer type wattmeter. (05 Marks)

c. A 4 pole shunt motor takes 22.5 amperes from a 250V supply. $R_a = 0.5\Omega$ and $R_{sh} = 125\Omega$. The armature is wave wound with 300 conductors if the flux per pole is 0.02 wb, calculate :

i) Speed
ii) Torque developed
iii) Power developed. (06 Marks)

OR

4 a. Derive an expression for the armature torque developed in a d.c motor. (05 Marks)

b. Sketch and explain :

i) Torque – armature current characteristics
ii) Speed – armature current characteristic for a d.c shunt motor. (05 Marks)

c. With a neat diagram, explain the working of an induction type of energy meter. (06 Marks)

Module-3

5 a. With the help of circuit diagram and phasor diagram, find the phase angle, impedance and power in case of R-L series circuit. (05 Marks)

b. With a neat diagram, explain the pipe earthing. (05 Marks)

c. A circuit consists of a resistance of 10Ω, an inductance of 16mH and a capacitance of 150μF connected in series. A supply of 100V at 50Hz is given to the circuit. Find the current, p.f and power consumed by the circuit. Draw the vector diagram. (06 Marks)

OR

6 a. Prove that the current in a purely inductive circuit lags behind the applied voltage by 90°. (05 Marks)

b. With relevant circuit diagrams and switching table, explain three way controls of Lamps. (05 Marks)

c. Two circuits A and B are connected in parallel across 200V, 50Hz supply circuit A consists of 10Ω resistance and 0.12H inductance in series while circuit B consists of 20Ω resistance in series with 40μF capacitor. Calculate :

i) Current in each branch
ii) Supply current
iii) Total power factor. (06 Marks)

Module-4

7 a. For a three phase star connection, find the relation between line and phase values of current and voltages. Also derive the equation for the three phase power. (05 Marks)

b. Obtain the expression for emf of an alternator and give the significance of the winding factor. (05 Marks)

c. Two wattmeter's connected to measure the power in a 3 phase circuit read 5kW and 1kW. The latter being read after reversing the current coil. Calculate the power, power factor, total volt-amperes and reactive volt amperes. (06 Marks)

OR

8 a. With necessary sketches distinguish between salient pole and cylindrical pole type synchronous generator. (05 Marks)

b. Show that two wattmeter's are sufficient to measure power in 3-phase balanced star connected circuit with neat circuit and phasor diagram. (05 Marks)

c. A 6 pole 3 phase, 50Hz alternator 12 slot per pole and 4 conductor per slot. The winding is $\frac{5}{6}$ full pitched. A flux of 25 mwb per pole is sinusoidally distributed along the air gap. Determine the line e.m.f if the alternator is star connected. (06 Marks)

Module-5

9 a. Explain the various losses that occur in a transformer. (05 Marks)

b. Define slip. Derive an expression for frequency of rotor current. (05 Marks)

c. A 10KVA, 400/200V, 50Hz single phase transformer has a full load copper loss of 200W and has a full load efficiency of 96% at 0.8pf lagging. Determine the iron loss. What would be the efficiency at half of the full load and unity p.f? (06 Marks)

OR

10 a. Explain the principle of operation of a 3 phase Induction motor and give reason for an induction motor cannot run at synchronous speed. (05 Marks)

b. Derive the EMF equation of a transformer. (05 Marks)

c. A 4 pole 3 ϕ 50Hz induction motor runs at a speed of 1470 rpm. Find the synchronous speed, the slip and frequency of the induced emf in the rotor under this condition. (06 Marks)

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SRI SAIRAM COLLEGE OF ENGINEERING

USN | 1 | S | B | 1 | 4 | M | E | 0 | 1 | 9 | | 14ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting ONE full question from each module.*

Module – 1

1 a. State and explain Kirchoff's laws. (06 Marks)

b. A resistor of 2.6 Ω is connected in series with a parallel combination of 4Ω and 6Ω resistors. If the power consumed in 4Ω resistor is 36 watts, find :
(i) Voltage across different resistors.
(ii) Source voltage.
(iii) Source current. (08 Marks)

c. Compare and contrast electric and magnetic circuits. (06 Marks)

2 a. For the circuit shown in Fig. Q2 (a), find
(i) Current supplied by each battery.
(ii) Total current supplied to 10Ω resistor.
(iii) Total energy delivered to 10 Ω resistor, when the circuit is in ON condition for 4 hours. (07 Marks)

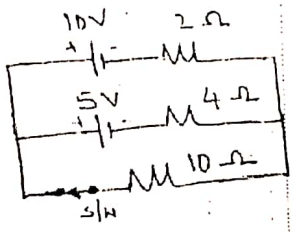

Fig. Q2 (a)

b. Obtain an expression for energy stored in an inductor. (05 Marks)

c. Two coils X of 12,000 turns and Y of 15,000 turns, lie in parallel planes such that 45% of the flux produced by coil X links coil Y. A current of 5 A in X produces 0.05 wb while the same current in Y produces 0.075 wb. Calculate
(i) The mutual inductance (ii) The coupling coefficient
(iii) The percentage of flux produced by coil Y linking coil X. (08 Marks)

Module – 2

3 a. Give a brief classification of dc generators with equivalent circuits. (06 Marks)

b. A 200 V, 4 pole, lap wound dc shunt motor has 800 armature conductors. The resistances of the armature and shunt field windings are 0.5 Ω and 200 Ω respectively. The motor takes a current of 21A and the flux produced per pole is 30 MWb. Find the speed and gross torque. There is brush contact drop of 1 volt across each brush. (08 Marks)

c. Explain with a neat diagram, the construction and working principle of dynamometer type wattmeter. (06 Marks)

4 a. With usual notations, deduce an expression for emf induced in a dc generator. (06 Marks)

b. What is back emf in a dc motor? What is its significance? (04 Marks)

c. Explain, why a series motor should not be started without load over it? (04 Marks)

d. With a neat diagram, explain the construction and working of induction type energy meter. (06 Marks)

Module – 3

5 a. Explain the following terms:
(i) Peak value (ii) Frequency
(iii) RMS value with respect to an alternating quantity. (06 Marks)

b. Draw the vector diagram of RLC series circuit when:
(i) Inductive reactance exceeds capacitive reactance.
(ii) Capacitive reactance exceeds inductive reactance.
(iii) Both inductive and capacitive reactances are equal. (06 Marks)

c. With neat diagram, explain control of a lamp from three different locations. (05 Marks)

d. What precautions should be taken against electric shock? (03 Marks)

6 a. Prove that current in a pure inductive circuit lags behind the applied voltage by 90°. Also draw the power curves. (07 Marks)

b. A circuit drives a current of (4+j3)A from a (180+j160) volt source. Find the circuit elements, if the supply frequency is 50 Hz. (07 Marks)

c. Write notes on: (i) Minitature Circuit Breaker (MCB)
(ii) Earth Leakage Circuit Breaker (ELCB). (06 Marks)

Module – 4

7 a. What are the advantages of three phase over single phase system? (05 Marks)

b. Obtain relation between line and phase values of currents in three phase delta system. (07 Marks)

c. A 12 pole, 500 rpm star connected alternator has 60 slots with 20 conductors/slot. The flux /pole is 0.02 wb which is sinusoidally distributed. The winding factor is 0.97. Calculate frequency and magnitude of line and phase emfs. (08 Marks)

8 a. Obtain an expression for power factor angle, when power is measured using two wattmeters. (07 Marks)

b. Three similar coils each having resistance of 10 Ω and inductive reactance of 8 Ω are connected in STAR across 400 V, 3 phase supply. Determine (i) Line current (ii) Phase current (iii) Total power and readings of each wattmeter connected to measure power. (07 Marks)

c. Explain different types of rotors in synchronous generators. (06 Marks)

Module – 5

9 a. Show that iron losses and copper losses are equal for maximum efficiency in a transformer. (06 Marks)

b. A 250 KVA, 1 phase transformer has an efficiency of 98.135% at full load 0.8 lagging power factor. The efficiency was found to be 97.751% at half-full load 0.9 pf. Calculate iron and copper losses. (08 Marks)

c. Explain the working principle of a 3 phase induction motor. (06 Marks)

10 a. Obtain emf equation of transformer. (06 Marks)

b. Write about various losses that occur in a transformer. (06 Marks)

c. A four pole, 3 phase induction motor is supplied by 50 Hz AC supply. Find (i) Synchronous speed (ii) Motor speed and (iii) Frequency of rotor induced currents if the slip is 4%. (08 Marks)

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SRI SAIRAM COLLEGE OF ENGINEERING

CBCS SCHEME

USN | | | | | | | | | | |

17ELE15

First Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. State Ohm's law. Mention its limitations. (05 Marks)

b. State and explain Kirchoff's laws as applied to D.C circuits. (08 Marks)

c. A coil of 150 turns is linked with a flux of 0.01 weber when carrying a current of 10 A. Calculate the inductance of the coil. If the current is uniformly reversed in 0.01 sec, calculate the induced electromotive force. (07 Marks)

OR

2 a. Define dynamically induced e.m.f and statically induced e.m.f with examples. (06 Marks)

b. Two resistors connected in parallel across 100V D.C supply. The total current from the supply source is 10 A. The power dissipated in one resistor is 600 W. What is the current drawn when they are connected in series across the same supply. (08 Marks)

c. Define the co-efficient of coupling and find its relation with L_1, L_2 and M. (06 Marks)

Module-2

3 a. With a neat sketch, explain the construction of the various parts of a D.C generator. (08 Marks)

b. What is the significance of back EMF in a D.C motor? (06 Marks)

c. With a neat figure, explain the construction and working principle of a dynamometer type wattmeter. (06 Marks)

OR

4 a. Derive the EMF equation of D.C generator. (06 Marks)

b. Find the useful flux per pole of a 250V, 6 pole shunt motor (D.C) having a two circuit connected armature winding with 220 conductors. At normal working temperature, the overall armature resistance including brushes is 0.2 Ω. The armature current is 13.3 A at the no-load speed of 908 rpm. (08 Marks)

c. Describe with a neat sketch, the constructional details and operation of a single phase induction type energy meter. (06 Marks)

Module-3

5 a. Derive an expression for power in pure capacitor circuit and draw voltage, current and power waveforms. (07 Marks)

b. A series circuit with a resistor of 100 Ω, capacitor of 25 μF and inductance of 0.15 H is connected across 220 V, 50 Hz supply. Calculate impedance, current, power and power factor of the circuit. (08 Marks)

c. With a neat sketch, explain 3-way control of Lamp. (05 Marks)

OR

6 a. Define earthing. Explain any one type of earthing with a neat diagram. (06 Marks)

b. Two impedances $(150 - 157j)\Omega$ and $(100 + 110j)\Omega$ are connected in parallel across 200 V, 50 Hz supply. Find branch currents, total current and total power consumed in the circuit. Draw the phasor diagram. (08 Marks)

c. Define power factor and mention its practical importance. (06 Marks)

Module-4

7 a. In a three phase star connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. (06 Marks)

b. Show that the two wattmeters are sufficient to measure three phase power. Also derive an expression for the power factor in terms of wattmeter readings. (06 Marks)

c. A 6 pole, 3 phase, stars connected alternator has an armature with 90 slots and 12 conductors per slot. If revolves at 1000 rpm, the flux per pole being 0.5 web. Calculate the emf generated, if the winding factor is 0.97 and all the conductors in each phase are in series. The coil is full pitched. (08 Marks)

OR

8 a. Mention the advantages of three phase system over single phase system. (06 Marks)

b. With neat sketches, explain the construction of salient pole alternator. (07 Marks)

c. A three phase load of three equal impedances connected in delta across a balanced 400 V supply takes a line current of 10 A, at a power factor of 0.7 lagging. Calculate
(i) The phase current, (ii) Total power. (iii) The total reactive volt Ampers. (07 Marks)

Module-5

9 a. Derive EMF equation of transformer. (06 Marks)

b. The maximum efficiency at full load and upf of a single phase 25 kVA, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 p.f (ii) 50% load 0.8 p.f (iii) 25% load 0.6 p.f. (07 Marks)

c. A three phase 6 pole 50 Hz induction motor has a slip of 1% at No-load and 3% at full load. Determine (i) synchronous speed (ii) No-load speed (iii) Full load speed (iv) Frequency of rotor current at stand still (v) Frequency of rotor of rotor current at full load. (07 Marks)

OR

10 a. Derive the condition for which the efficiency of a transformer is maximum. (06 Marks)

b. Define slip. Derive an expression for frequency of Rotor current. (06 Marks)

c. A single phase, 20 kVA transformer has 1000 primary turns and 2500 secondary turns. The net cross-sectional area of the core is 100 cm^2. When the primary winding is connected to 550 V, 50 Hz supply. Calculate (i) The maximum value of the flux density in the core (ii) the voltage induced in the secondary winding and (iii) The primary and secondary full load currents. (08 Marks)

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SRI SAIRAM COLLEGE OF ENGINEERING

CBCS Scheme

USN | 1 | S | B | 1 | 6 | C | S | 0 | 7 | 1 | 15ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. State and explain Kirchhoff's law. **(05 Marks)**

b. Refer Fig Q1(b). Find I_1, I_2 and I_3. **(07 Marks)**

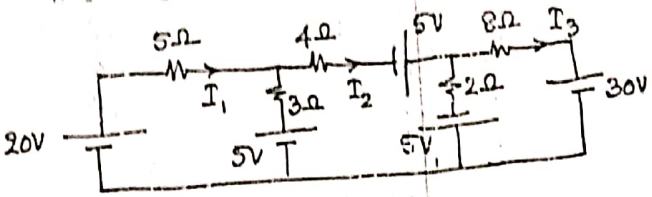

Fig. Q1(b)

c. Coil A of 230 turns and coil B of 240 turns share a magnetic circuit of mean length 0.8m and uniform cross section area 115cm^2. Relative permeability of the core material is 1350. Find the self inductances of the coils. Find the average emf induced in coil A when, in coil B, the current changes from 2A to 6.5A in 0.03s. Assume k = 1.0 between the coils. **(04 Marks)**

OR

2 a. Define 'Self Inductance' of a coil. Derive an expression for the self inductance of a coil in terms of its geometry and material properties. **(05 Marks)**

b. Refer Fig Q2(b) find I_1, I_2 and the power in the 6Ω resistor. **(07 Marks)**

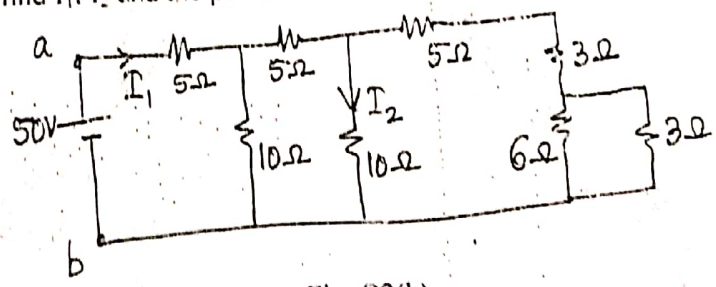

Fig. Q2(b)

c. Coil A of 600 turns and coil B of 500 turns have k = 0.2. A current of 8A in coil A produces 40mWb flux in it. Find : i) Inductance of coil A with coil B open circuited ; ii) the flux linking coil B ; iii) the emf induced in coil B if the flux linking it falls to zero from its full value in 2ms ; and iv) mutual inductance between the coils. **(04 Marks)**

Module-2

3 a. Deduce an expression for the armature torque, T_a, developed in a dc motor and hence show that $T_a \alpha \phi I_a$. **(02 Marks)**

b. A 100V short shunt dc generator supplies 200 lamps of 55W at 110V rating. $R_a = 0.06\Omega$; $R_{se} = 0.04\Omega$; and $R_{sh} = 25\Omega$. Sketch the circuit diagram and find the emf generated. **(07 Marks)**

c. With a neat sketch, explain the working of a 1ϕ energy meter. **(07 Marks)**

OR

4 a. "A dc series motor should never be run on light or no load". Justify. (03 Marks)

b. A shunt dc generator delivers 65kW at 250V and 500rpm. $R_a = 0.015\Omega$ and $R_{sh} = 85\Omega$. Find its speed when running as a motor taking 40kW from 240V supply. BCD = 1V/Brush. Sketch relevant circuit diagrams. (07 Marks)

c. With a neat schematic, describe the construction and working of a dynamometer type wattmeter. (06 Marks)

Module-3

5 a. Show that a pure inductor is lossless. (03 Marks)

b. Refer Fig. Q5 (b). Find the real power, reactive power and the apparent power supplied.

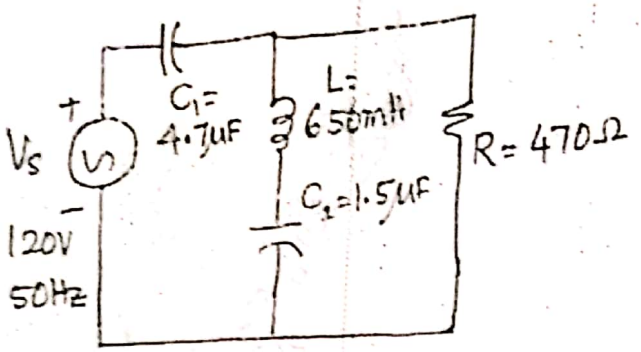

Fig. Q5(b) (06 Marks)

c. With a neat circuit diagram and truth table, explain the working of a 3-way control of a device. (07 Marks)

OR

6 a. Show that an R-C series circuit takes a leading current. Sketch a phasor diagram indicating the supply emf, the current and the two drops. (07 Marks)

b. A resonant series circuit with R = 5Ω, L = 1mH and C = 0.001μF is connected to a 100V supply. Find :

i) the drop across L : and

ii) drop across C. Take the supply as the reference phasor. (05 Marks)

c. For a fuse, define i) Rated current, ii) Fusing current : and iii) Fusing factor. Why is the fusing factor greater than unity? (04 Marks)

Module-4

7 a. Sketch a 4-wire STAR supply and identify the phase and line voltages. With balanced supply taking $E_R = E_P \angle 0^\circ$, obtain the relationship between the phase and line voltages. Hence, sketch a phasor diagram indicting all phase and line voltages. (08 Marks)

b. 2 wattmeters connected to measures 3ϕ power of a balanced Δ load read 2.5 kW and 0.5kW. Find the load pf if i) both readings are positive; and ii) the latter reading is obtained after reversing the connections of the potential coil. (04 Marks)

c. In a 3ϕ alternator, why is it advantageous to have the armature on the stator and the excitation on the rotor? (04 Marks)

OR

8 a. With a neat circuit diagram, show how 3ϕ power can be measured using two Wattmeters. State the NECESSARY CONDITION clearly. **(07 Marks)**

b. A balanced Δ load of (8+j6) Ω/phase is connected to a 400V supply. Find i) the phase current ii) the line current. If the same impedances are connected in STAR, what is the reactive power consumed and at what pf? **(04 Marks)**

c. A 4-pole, 3ϕ alternator driven at 1800rpm has 42 slots with 4 conductors/slot. Average flux/pole is 0.36 Wb, sinusoidally distributed. $K_p = 0.956$ and $K_d = 0.952$. Find the line voltage on no-load if connected in i) Δ ; and ii) STAR. **(05 Marks)**

Module-5

9 a. Starting from expression for the efficiency of a transformer derive the condition for maximum efficiency and the expression for maximum efficiency. **(05 Marks)**

b. A 135 kVA, 1ϕ transformer has primary of 2kV, 50Hz. Primary and secondary number of turns are 162 and 48 respectively. Neglecting losses, find i) no-load secondary emf ; ii) full load primary and secondary currents; and iii) maximum core flux. **(04 Marks)**

c. With a neat sketch, explain the working of a STAR - Δ starter, for a 3ϕ induction motor. Show that the starting inrush current is reduced by 66.7%. **(07 Marks)**

OR

10 a. "A 3ϕ induction motor can never run at N_s". Justify. **(04 Marks)**

b. A single phase transformer has a maximum efficiency of 98% at 75% load, upf. The copper loss at maximum efficiency is 314W. Find its efficiency at 50% load, 0.9 pf. **(04 Marks)**

c. A 6-pole, 3ϕ alternator running at 1200rpm feeds a 4-pole, 3ϕinduction motor having slips of 3% at full load and 2.5% at half load. The rotor induced emf/phase at stand still is 160V. At full load and half load, find each of the following: i) the motor speed ; ii) frequency of the rotor induced emf and (iii) the rotor induced emf/phase. **(08 Marks)**

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