

17ELE15

# First Semester B.E. Degree Examination, Dec.2017/Jan. 2018 <br> 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. Menton its limitations.
(05 Marks)
b. • State and explain Kirchoff,s laws as applied to. D. 0 circuits.. , (08 Marks)
c. A coil of 150 turns is linked with a_flux of $\mathbf{0 , 0 1}$ weber when carrying a current $\underline{o f} 10 \mathrm{~A}$. Calculate the "inductanCe or the coil. If the current' is uniformly reversed in 0.01 sec , -

-     - calculate the induced diOUtOrtiOtiVe forCd." - - - - ---'-'- ,
(07 Marks)


## OR

2 a. Define dynamically induced e.m.f arid statically induced e.m.f with example (06 Marks)
b. Two resistors connected in parallelacross 00 V D. 0 supply. The total current fi om 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 L1, L., and M. (06 Marks)

## MOdule-2

3 a. With a neat sketch, explain the construction of the various parts of a D. 0 generator.
(08 Marks)
lî́. What is the significance of back E1V1F in 1 D. 0 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. 0 generator.
(06 Marks)
b. Find the useful fiuk per pole of a $250 \mathrm{~V}, 6$ 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 O . 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 typo 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 n , capacitor of 251.1 F and inductance of 0.15 H is connected across $220 \mathrm{~V}, 50 \mathrm{~Hz}$ supply. Calculate impedance, current, power and power factor of the circuit.
c. With a neat sketch, explain 3-way control of Lamp.

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6 a. Define earthing. Explain any one type of earthing with a neat diagram.
(06 Marks)
b. Two impedances $(150-157 \mathrm{j}) \mathrm{C} 2$ and $(100+110 \mathrm{j}) 0$ are connected in parallel across 200 V , 50 sapply. Find branch currents, total current and total power consuined 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 starconnection, 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 aitmeters are sufficient to measure three phase power. Also-derive an
.-' $^{-}$- expression for the power'factor in terms of wattmeter readings.
.c. A 6 pole, 3 phase, stars $\bullet$ 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.' Caleulate 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)

8 a. Mention the advantages of three phase systemover 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

- -- $\quad$ takes aline current of $1 \mathrm{G}^{\circ} \mathrm{A}$, at a power factor of 0.7 lagging. Calculate
(1) The phase current, (ii) Total power, (iii) The total reactive volt Ampers.
(07 Marks)


## Module-5

) a. Derive EMF equation of transformer.
(06 Marks)
15: The maximum efficiency at full load and upf of a single phase $25 \mathrm{kVA}, 500 / 1000 \mathrm{~V}, 50 \mathrm{~Hz}$ 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) synchid nous speed (ii) No-load speed (iii) Full load speed (iv) Frequency of rotor current at ta.nd still (v) Frequency of rotor of rotor current at full load. (07 Marks)

## OR

10 a. Derive the coriditiO 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 $100 \mathrm{~cm}^{2}$. When the primary winding is connected to $550 \mathrm{~V}, 50$ E-1z 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.
(48 Marks)

