10ELE15/25

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 at least two from each part.*

PART - A

1 a. Choose the correct answers for the following :   **(04 Marks)**
  i) The equivalent resistance of two branch parallel circuit will be _____
    A) Higher than greatest R   B) Smaller than smallest R
    C) Equal to any one R   D) None of these
  ii) Branch current division method is Applicable to _____
    A) Two   B) One   C) Three   D) Four
  iii) According to ____ Law, the induced EMF opposite the cause producing it
    A) Ohm's   B) Faraday's law   C) Lenz's   D) Kirchhott's law
  iv) The self inductance is the property of _____
    A) Conductor   B) Coil   C) Insulator   D) None of these

 b. State and explain Faraday's law of Electromagnetic Induction.   **(05 Marks)**

 c. For the circuit shown in fig.Q1(c), calculate the value of the current in either branch and the value of unknown resistance 'R'. When the total current taken by the circuit is 2.25A.   **(06 Marks)**

Fig.Q1(c)
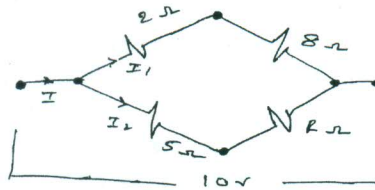
 d. A coil consists of 750 turns. A current of 10A in the coil gives rise to a magnetic flux of 1200 μwb. Determine the inductance of the coil and the average EMF induced in the coil when this current is reversed in 10ms. Also find the energy stored in inductance. **(05 Marks)**

2 a. Choose the correct answers for the following :   **(04 Marks)**
  i) Power consumed by a pure inductive circuit is
    A) Zero   B) Infinity   C) Non zero   D) None of these
  ii) Peak value of a sine wave is 400V. its average value is _____
    A) 565.5V   B) 282.6V   C) 400V   D) 254.6V
  iii) In a R – L series circuit, $V_R = 8V$ & $V_L = 6V$. The magnitude of total voltage is
    A) 8V   B) 6V   C) 10V   D) 5V
  iv) As the p.f. increases, phase angle
    A) Decreases   B) Increases   C) Remains same   D) None of these

 b. Show that average power consumed in a pure resistive circuit is never zero. **(05 Marks)**

 c. A coil of power factor 0.6 is in series with a 100μf capacitance. When connected to a 50Hz supply, the potential difference across the coil is equal to the potential difference across the capacitance. Find the resistance and inductance of the coil. **(06 Marks)**

 d. Two impedances (20 + j15) Ω and (30 – j20) Ω are connected in parallel. Find the branch currents if the total current is ∠-30⁰A. Draw the vector diagram. **(05 Marks)**

3   a. Choose the correct answers for the following :   (04 Marks)
     i) Algebric sum of all the phase voltages at any time in a 3 – phase balanced system is____
       A) zero   B) one   C) infinity   D) None of these
     ii) For the same rating, the size of a 3 – ϕ machine is _____ that of 1 – ϕ machine
       A) more than   B) same as   C) less than   D) None of these
     iii) In the measurement of 3 – ϕ power by 2 wattameter method if one of the wattameter reads zero, then the p.f of the circuit is
       A) zero   B) unity   C) between 0 and 1   D) 0.5
     iv) The total apparent power in a 3 – ϕ system is given by
       A) $\sqrt{3}\ V_L\ I_L$ B) $\sqrt{3}\ V_L\ I_L \cos\phi$ C) $\sqrt{3}\ V_L\ I_L \sin\phi$ D) $V_L\ I_L$

    b. Show that in 3 phase, star connected system, the line voltage is $\sqrt{3}$ time phase voltage.
                                                                             (05 Marks)
    c. A 3 phase, star connected supply with a phase voltage of 230V is supplying a balanced Delta load. The load draws 15kw at 0.8 pf. lagging. Find circuit parameters.   (06 Marks)
    d. During the measurement of power by two wattameter method, the total input power to a 3 phase, 440V, motor running at a p.f of 0.8, was found to be 25kw. Find the readings of the two wattmeters.   (05 Marks)

4   a. Choose the correct answers for the following :   (04 Marks)
     i) A fuse is a _____
       A) Protective device   B) Current limiting device
       C) Voltage limiting device   D) Power limiting device
     ii) In a Dynamometer wattameter the fixed coil is ____
       A) Current coil   B) Potential coil
       C) Both currents potential coil   D) None of these
     iii) A good earthing should provide____resistance in earth path
       A) Low   B) High   C) Medium   D) None of these
     iv) In energy meter, constant speed of Rotation of disc is provided by _____
       A) Shunt magnet   B) Series magnet   C) Braking magnet   D) None of these
    b. Explain the construction and working of single phase induction type energy meter.(08 Marks)
    c. With neat sketch, explain plate earthing.   (04 Marks)
    d. Explain the factors affecting the selection of wiring.   (04 Marks)

PART - B

5   a. Choose the correct answers for the following :   (04 Marks)
     i) Generator works on the principles of _____
       A) Statically induced EMF   B) Mutually Induced EMF
       C) Dynamically induced EMF   D) None of these
     ii) Number of parallel paths equal to the number of poles in _____ winding
       A) Wave   B) Lap   C) Both in wave and lap   D) None of these
     iii) _____ Generator is used for Battery charging.
       A) DC series   B) DC shunt   C) Both series and shunt   D) None of these
     iv) Function of a starter in a DC motor is to _____
       A) Control its speed   B) Increase starting torque
       C) Limit starting current   D) None of these
    b. What is back EMF? Explain its significance.   (05 Marks)
    c. A DC shunt generator supplying load of 5kw at a voltage of 250V. If it has shunt field resistance of 100Ω and armature resistance of 0.22Ω, calculate generated EMF. (05 Marks)
    d. A 230V, DC shunt motor takes a no load current of 3A and runs at 1100 rpm. If the full load current is 41A, find the speed on full load. Take armature resistance of 0.25Ω and shunt field resistance of 230Ω.   (06 Marks)

6 a. Choose the correct answers for the following : **(04 Marks)**
   i) A transformer is_____ and _____ device
       A) Static and DC   B) Static and AC
       C) Dynamic and AC   D) Dynamic and DC
   ii) Number of primary winding of a Transformer depends on
       A) Input voltage   B) Input current   C) the KVA   D) None of these
   iii) The frequency of secondary voltage is _____ that of the primary voltage
       A) Greater than   B) lesser than   C) same as   D) None of these
   iv) Losses which vary with load in a transformer are
       A) Eddy current losses   B) Copper loss
       C) Hysteresis loss   D) Frictional loss

   b. What is Transformer? Derive an expression for induced EMF. **(05 Marks)**
   c. A 50KVA, single phase transformer has 600 turns on primary & 40 turns on the secondary. The primary winding is connected to the 2200 kv, 50Hz supply. Calculate i) secondary voltage on no load   ii) Full load primary & secondary current. **(05 Marks)**
   d. A single phase transformer working at 0.8p.f has a efficiency of 94% at both 3/4th full load & full load. Determine the efficiency at half of full load and UPF. **(06 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**
   i) In an alternator_____is a rotating part
       A) Field system   B) Armature system
       C) Both field and armature   D) None of these
   ii) Salient pole type rotor has _____diameter and _____axial length
       A) Larger , Larger   B) Smaller , Smaller   C) Larger, Smaller   D) Smaller , Larger
   iii) Field winding of an Alternator is excited by _____
       A) AC   B) DC   C) Both AC & DC   D) None of these
   iv) Number of cycles generated in a 6 pole Alternator in one revolution
       A) 1   B) 2   C) 3   D) 4

   b. What are the advantages of rotating field synchronous generator? **(04 Marks)**
   c. Derive an expression for induced EMF equation for a star connected Alternator. **(06 Marks)**
   d. A 6 pole, 3 phase. Star connected Alternator has a armature with 90 slots and 12 conductors / slot. It rotates at 1000 rpm, the flux/phase being 50mwb. Calculate the line value of EMF generated, if the K_d = 0.96 and K_c = 0.97. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**
   i) An Induction motor works with _____supply
       A) DC   B) AC   C) Both DC & AC   D) None of these
   ii) Frame of Induction motor is usually made of _____
       A) Silicon steel   B) Cast Iron   C) Aluminum   D) Bronze
   iii) Stator winding of 3 − φ Induction motor produces magnetic field
       A) Alternative   B) Pulsating   C) Constant   D) Rotating
   iv) In Squirrel cage rotor , slots are skewed because
       A) To reduce loss   B) To give support
       C) To reduce Magnetic hum   D) To reduce friction

   b. Explain the construction of 3 phase Induction motor. **(06 Marks)**
   c. Explain the working of 3 phase Induction motor. **(05 Marks)**
   d. A 3 phase Induction motor has 6 polar and running at 960 rpm on full load. It is supplied from a Alternator having 4 poles and running at 1500 rpm. Calculate the full load slip and frequency of induced EMF. **(05 Marks)**

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