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Total Number of Pages : 03

B.Tech
RBE1B001

1st Semester Regular/Back Examination 2019-20

BASIC ELECTRICAL ENGINEERING

BRANCH : AEIE, AERO, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, CST, ECE, EEE, EIE, ELECTRICAL, ELECTRICAL & C.E, ELECTRONICS & AMP; C.E, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Max Marks : 100

Time : 3 Hours

Q.CODE : HRB712

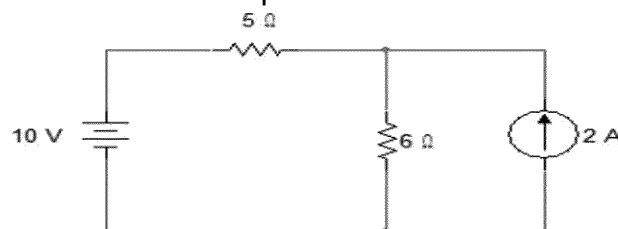
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

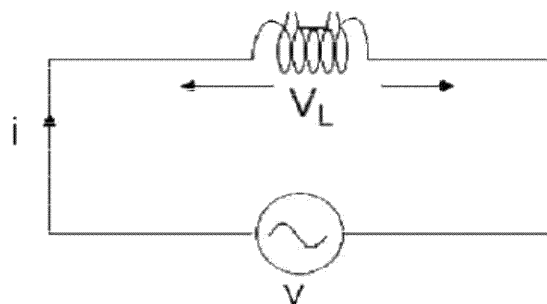
Part-I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- State Ohm's Law and mention the limitations of Ohm's Law.
- How transformers are classified according to their construction?
- Determine the number of branches and nodes in the circuit shown. Identify which elements are in series and which are in parallel.



- Represent the wave form with proper labels in a single plot.
 $Y_1 = 200\sin(\omega t)$, $Y_2 = 150\sin(\omega t + \phi)$.
- Explain the phasor relation of voltage and current with proper diagram for the circuit given below.

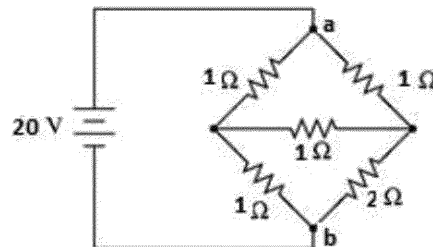


- f) Mention different types of 3 phase induction motors available and mention the criteria of classifications.
- g) Can we connect two battery sources of different voltage ratings in parallel? Justify your answer.
- h) Explain, what is magnetizing force. Give the relation between flux, mmf and reluctance.
- i) Write the relation between the line and phase value of voltage and current in a balanced starconnected load?
- j) Explain, what do you mean by hysteresis loss?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) A series circuit has $R=10\Omega$, $L=50\text{mH}$, and $C=80\mu\text{F}$ and is supplied with $220\text{V}, 50\text{Hz}$. Find (i) impedance (ii) current (iii) power (iv) power factor (v) voltage drop across the each element.
- b) Three impedances $Z_1 = (5 + j5)\Omega$, $Z_2 = -j8\Omega$ and $Z_3 = 4\Omega$ are connected in series to an unknown voltage source V . Find I and V , if the voltage drop across Z_3 is $63.2 \angle 18.45^\circ \text{V}$.
- c) For the bridge network shown, determine the total resistance seen from the terminals AB using star-delta transformation.



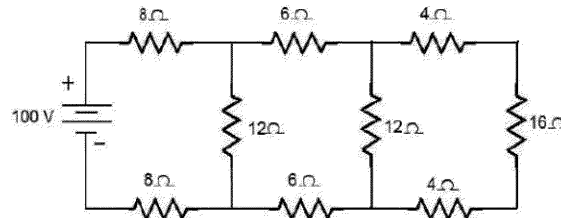
- d) Derive the EMF equation of a transformer and draw the no load phasor diagram for single phase transformer.
- e) An iron ring has cross sectional area $A=500 \text{ sqmm}$, and a mean length of $L=1000\text{mm}$. Find the ampere-turns required to produce a flux density $B=2\text{T}$, Given $H=1000\text{Am}^{-1}$.
- f) A star connected load consists of identical resistance of 30 ohms and inductance of 125mH. If the line current is 5A, calculate the line voltage.
- g) Define Average value, RMS value and Form Factor and Explain how to find the values for sinusoidal wave.
- h) A 230v, 50 Hz, is applied a series connected resistor 30 ohms and inductor 0.5mH, then find the impedance X_L , current through the circuit, voltage across each component, and also draw phasor diagram between current and voltage.
- i) With proper sketch, Explain the principle of operation of DC Motor.
- j) Define Thevenin's theorem and explain in steps with proper diagram.
- k) Explain in brief with neat circuit diagram for open circuit and short circuit test on single phase transformer.
- l) Two wattmeters are used to measure the power in a 3-phase balanced load. The wattmeter readings are 8.2kW and 7.5kW, Calculate the (i) Total power (ii) Power factor and (iii) Reactive power

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A 4 pole, wave wound generator having 40 slots and 10 conductors placed per slot. The flux per pole is 0.03 wb. Calculate the generated emf when the generator is driven at 1500rpm. **(16)**

Q4 For the given circuit Calculate a) the equivalent resistances across the terminals of the supply, b) total current supplied by the source and c) power delivered to 16 ohm resistor. **(16)**



Q5 Deduce an expression for the frequency of the rotor current in induction motor. A 4-pole, 3 phase induction motor operates from supply of frequency 50Hz. Calculate the followings: **(16)**

- (i) Synchronous speed (ii) The speed of the rotor, when the slip is 0.04 (iii) The frequency of the rotor current when slip is 0.03. (iv) the Frequency of rotor current at rotor standstill.

Q6 A transformer with 40 turns on the high voltage winding is used to step down the voltage from 240V to 120V. Find the number of turns in the low voltage winding. **(16)**