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Total Number of Pages : 03

B.TECH

AR-17

B.TECH 1ST SEMESTER EXAMINATIONS(BACK), DECEMBER 2019

BBSES1042- BASICS OF ELECTRICAL ENGINEERING

Time: 3 Hours

Max Marks : 100

The figures in the right hand margin indicate marks.

PART-A

(10X1 = 10 MARKS)

Answer all questions.

- Any closed path formed by branches in a network is called a_____.
- When resistor connected in parallel then the voltage across each resistor is _____.
- The formula for resistivity of the conductor is_____.
- The expression for reluctance in term of length and area of cross section is _____.
- Those magnetic materials are best for making the armature and transformer cores which have _____ permeability and _____ hysteresis loss.
- Time constant in an RL circuit is_____.
- No load in a transformer is carried out to determine _____
- Tesla is the unit of _____.
- A magnetic field exists around_____.
- Peak factor of an alternating wave is the ratio of _____.

PART-B

(15 x 2 = 30 MARKS)

Answer any fifteen questions from the following.

- Two impedances $4+j3$ ohm and $4-j3$ ohm are connected in parallel .Find the impedance and Power factor
- Define reluctance ϵ and MMF in case of magnetic circuit
- What is Back Emf?
- We require a transformer to deliver 500mA at 24Volts from 120V supply. How many turns required in secondary.(Given no of turns in primary =3000)
- 3 resistor of resistances $R_1=10$ ohms, $R_2=10$ ohms and $R_3=5$ ohms are connected in star and convert it into delta network and find its equivalent resistance.
- Define unilateral and bilateral elements.
- An electromagnet has an air gap of 3 mm and the flux density in the gap is 1.3 Tesla. Calculate the ampere-turns required by the gap.
- Three identical impedances connected in delta draw a current of $(4 < 30^\circ)$ A, when connected across a 400V, 50 Hz AC supply. Find the phase current and total power consumption.
- A PMMC ammeter of resistance 4 ohms has a full scale value of 10A. What would be the new range if a shunt of value 0.5 ohm is connected?
- In a given circuit, three identical resistances each of value 15Ω are connected in star. Find the equivalent resistances in delta.
- In a series RC circuit, the supply voltage is 13V and the voltage across the resistor is 6V.Find the voltage across the capacitor and the phase angle between supply voltage and the current.
- A single phase transformer develops 200V at the secondary terminals on no load condition. If the



secondary winding has 1000 turns, Find the maximum flux in the core. Assume a 30V, 50 Hz single phase in the primary.

13. What is the back EMF in a DC motor? Write the expression for it and also explain each term.
14. Draw a block diagram of different sections of power systems by which the electric power reaches your home from generating station.
15. State and explain superposition theorem.
16. A resistance R is connected across DC supply of 220V and dissipates power of 440W what is the value of R?
17. Find the probable number of cores of an Induction motor having no-load speed of 1700rpm and supplied from 3-ph 50HZ supply.
18. Differentiate between active elements and passive elements with examples of each.
19. State Thevenin's theorem.
20. A balanced three phase star connected load of 200KW takes a lagging current of 100Amp when connected to a 410V, 50Hz supply. Find impedance of load per phase.

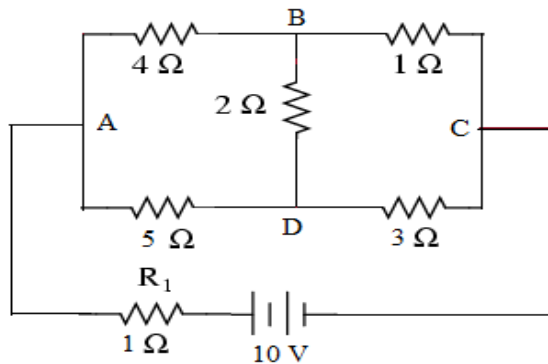
PART-C

(6 x 5 = 30 MARKS)

Section-i

Answer any Six questions

1. In the circuit shown in the fig. below determine the current through 2Ω resistance using Thevenin's theorem.

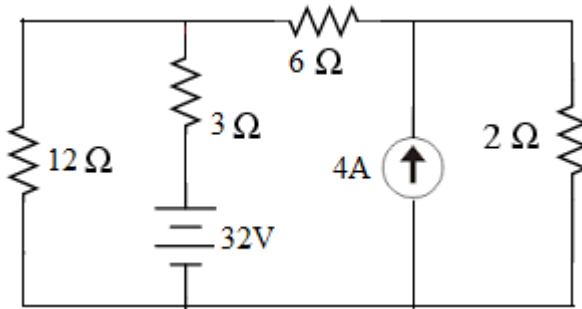


2. Derive the related expression for charging of the capacitor.
3. A 430V is applied to three star connected identical impedances each consisting of 40 ohms resistance in series with 3 ohm inductive reactance. Find
 - (i) Line current
 - (ii) Total power supplied.
4. A shunt motor develops 100V on no load, While running at 1000 RPM. If the machine has 4 poles and 100 wave wound armature conductors, Calculate the flux per pole. Also calculate the shunt field current if the resistance of the shunt field is 100Ω .
5. Draw the schematic layout diagram of a thermal power plant and explain the principle of power generation in such plants.
6. A magnetic circuit in the form of an iron ring comprises of a closed iron path of length 250mm and cross sectional area of 50mm^2 . A coil of 1000 turns is wound on the iron ring. Estimate the coil current to create a flux density of 0.25T in the iron ring assuming all the flux to pass through the given iron ring of the magnetic circuit. The relative permeability of iron is 2000 and the value of $\mu_0 = 4\pi \times 10^{-7} \text{H/m}$.
7. Explain about the constructional features of DC machines.
8. Explain the principle of hydro electric power generation with suitable diagram.

Section-iiAnswer any Two questions

(2 x 15 = 30 MARKS)

1. Derive the expression for power factor for a 3-phase AC circuit using two wattmeter method.
2. State and explain superposition theorem. Using superposition theorem, find the voltage drop in 9 ohm resistance.



3. What is a transformer? Discuss the operating principle of single phase transformer. Also derive the EMF equation of a two winding transformer.
4. Derive the Expression for growth and decay of transient current in RL circuit with DC excitation.

An inductor coil of inductance 0.5 H and resistance 10 Ω is connected to a DC source of 100 V. Assuming that steady state is already achieved, the battery is suddenly removed and replaced with shorted link at $t=0$. Calculate (i) Time constant of the circuit (ii) Initial and final steady state current and (iii) Time taken for the circuit to decay the current to 70% of the initial current.