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Total Number of Pages : 03

B.TECH

B.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017

BASICS ELECTRICAL ENGINEERING

Subject Code:BBSES1042

Time: 3 Hours

Max Marks : 100

The figures in the right hand margin indicate marks.

PART-A**(10X1 = 10 MARKS)****Answer all questions.**

- The armature of DC generator is laminated to reduce _____ loss.
- Mica is a _____ material.
- The resistance of a conductor is expressed as _____.
- Kirchhoff's current law is applicable at _____ only.
- The unit of magnetic flux is _____.
- Silicon steel is used in transformers due to _____.
- The period of a wave having 50 Hz frequency is _____.
- The form factor is the ratio of _____.
- A 3-phase, 440V, 50 Hz induction motor has 4% slip. The frequency of the rotor emf will be _____.
- The field coil of a DC generator excited by _____ supply.

PART-B**(15 x 2 = 30 MARKS)****Answer any fifteen questions from the following.**

- Explain how the voltage source with a source resistance can be converted into a equivalent current source.
- Why the core of a transformer is laminated?
- What is the time constant of a RL series circuit having $R = 20\Omega$ and $L=40$ mH?
- Two impedances $(2+j4)$ and $(4+j7)$ are connected in series find the equivalent impedance in polar form.
- A 3-phase, 50 Hz, 410V, 6 pole induction motor runs at 950 rpm. What is the slip of the induction motor?
- A circular iron ring is wound with 100 turns of coil develops a magnetic flux of 10miliwb.when the coil carries a current of 1A. Find the mmf of the source and reluctance of the ring.
- What is the RMS value of an alternating quantity? Find the RMS and average value of a sinusoidal quantity specified by: $v = 200 \sin 314t$.
- Find the impedance of the circuit when an alternating voltage $(100+j100)$ V is applied to it and the resulting current becomes $(20-j20)$ A.
- A 10H inductance coil of 10 ohm resistance is suddenly connected to a 20V d.c supply. Calculate the rate of change of current after 1 second.
- Write the speed equation of DC motor. Also explain the term associated with it.
- Define form factor of alternating quantity.
- An ac current is expressed by $i = 200\sin(200\omega t)$.After how many seconds the current will achieve a value of 100A

13. Write down the induced emf expression for a d.c. generator and name the various terms associated with it.
14. 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.
15. Define retentivity and permeability with reference to magnetic circuits
16. Explain briefly residual magnetism and its reason
17. For a 1-ph ac voltage write down the relationship among Peak Value,RMS value and Average value
18. In a circuit the voltage and current equations are given by $V=15\sin(\omega t+30)$ and $I=15\sin(\omega t-30)$. Find the power consumed in the circuit
19. Write the expression for Active power, Reactive power, Apparent Power and Complex power for 3phase system
20. A resistor of 20 Ohm is in series with 0.5 H inductor is connected across a supply of 250V 50Hz. Find the impedance in polar form.

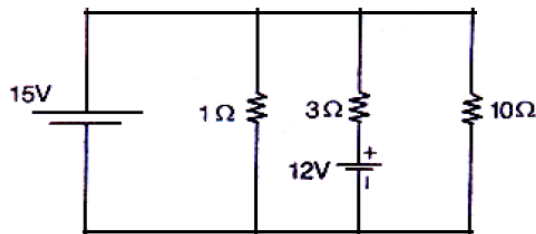
PART-C

(6 x 5 = 30 MARKS)

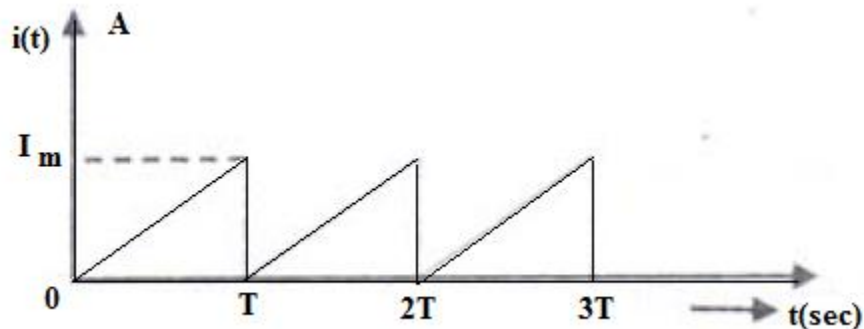
Section-i

Answer any Six questions

1. Using superposition theorem find the current through 10Ω resistance.



2. What do you mean by RMS value AC signal? Determine the RMS value of the given signal.



3. Explain the BH-curve for a magnetic material and explain how the hysteresis and eddy current losses can be minimized.
4. In an AC single phase circuit three impedances of value $6 \angle 45^\circ$, $4 \angle 60^\circ$ and $(3 - j8)$ ohms are connected in series across 220V, 50 Hz supply. Find the total combined impedance in polar form and magnitude of the current flowing in the circuit.
5. An iron ring with circular cross section of 4cm dia and a mean circumference of 110cm is wound with a coil of 500 turns. For an exciting current of 5 amp in the coil, the flux is found to be 2 mWb. Calculate the relative permeability of iron.

6. A balanced 3-ph star load has load impedance of $(5-j10)$ ohms per phase and is supplied from a balanced 3-ph 400V, 50 Hz AC supply.

Calculate the values for:

- Line voltages.
 - Phase voltages
 - Line currents
 - Phase currents.
 - Power consumption at the load.
7. 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 $\mu_0=4\pi\times 10^{-7}\text{H/m}$.
8. A PMMC measuring instrument gives full scale deflection when connected across 200V DC supply by taking a current of 4A. What should be the value of a suitable shunt resistance in order to enable the same current.

Section-ii

Answer any Two questions

(2 x 15 = 30 MARKS)

1. Explain superposition theorem applicable to electrical circuits. With the help of the principle solve the following problem.

Two batteries are connected in parallel with emf and internal resistances as 120V, 10 ohm and 150V, 20 ohm respectively. Another load resistance of 50 ohm is connected across battery terminals. Calculate

- Current through 50 ohm resistor.
 - Magnitude and flow of current in each battery.
 - Current in 50 ohm resistance if batteries are connected in series.
2. A three phase balanced inductive load consumes 25Kw power from a three phase 415V, 50Hz balanced source at a power factor of 0.8 lagging. Calculate the input line current of the load. How much current will flow in each phase of the load?
- If it is delta connected
 - If it is star connected
3. Explain the construction, principle of operation of a 3-phase induction motor.

Also discuss the torque-speed characteristics of an Induction motor.

4. Explain about different types of excitations of a DC generator. For a 6 pole DC shunt generator, the flux per pole is 5mWb. There are 100 conductors lap connected. Find the induced voltage if the armature rotates at a speed of 25 rev/sec.