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Total No. of Questions : 09]

[Total No. of Pages : 03

**B.Tech. (Sem. - 3<sup>rd</sup>)**

**MAGNETIC CIRCUITS & TRANSFORMERS**

**SUBJECT CODE : EE - 203**

**Paper ID : [A0403]**

[Note : Please fill subject code and paper ID on OMR]

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

**Section - A**

**Q1)**

**(10 x 2 = 20)**

- a) State Biot-Savart's law.
- b) State faradays laws of electromagnetic induction.
- c) What is meant by magnetic fringing? How does it affect the magnetic circuit?
- d) What is hysteresis loss? How can it be reduced?
- e) Define regulation and efficiency of a transformer.
- f) Give physical significance of leakage reactance.
- g) Why open circuit and short circuit tests are performed on transformer?
- h) What is meant by an auto transformer?
- i) Give limitations of off load tap changing transformer.
- j) Define all day efficiency and give its importance.

## Section - B

(4 x 5 = 20)

- Q2) Differentiate between the statically induced and dynamically induced emf. What is the nature of the hysteresis loop of ferrite material, and where is it used?
- Q3) The hysteresis and eddy current loss of a ferromagnetic sample at a frequency of 50 Hz is 25 watts and 30 watts respectively, when the flux density of 0.75 tesla. Calculate the total iron loss at a frequency of 400 Hz, when the operating flux density is 0.3 tesla.
- Q4) Draw and discuss the phasor diagram of a transformer on load, when it is taking inductive load.
- Q5) Explain the parallel operation of single phase transformers.
- Q6) Discuss procedure for conversion of 2 winding transformer into auto transformer.

## Section - C

(2 x 10 = 20)

- Q7) (a) Briefly discuss a test to separate the hysteresis loss and eddy current loss from the core loss of a transformer.
- (b) A 5 kVA single phase transformer has a core loss of 50 watts and full load ohmic loss of 100 watts. The daily variation of load on the transformer is as follows:

7 AM to 1 PM	3 kW at power factor 0.6 lagging.
1 PM to 6 PM	2 kW at power factor 0.8 lagging.
6 PM to 1 PM	5 kW at power factor 0.9 lagging.
1 AM to 7 AM	No load

Determine the all day efficiency.

- Q8) (a) Discuss the nature of inrush current when a transformer is switched in to the supply (i) when instantaneous supply voltage is zero (ii) when the instantaneous supply voltage is positive maximum.
- (b) How three phase to two phase conversion is possible using two single phase transformers.
- Q9) (a) A 3-phase, 6600/415 V, 2000 kVA transformer has a per unit resistance of 0.02 and a per unit leakage reactance of 0.1. Calculate the Copper loss and regulation at full load 0.8 power factor.
- (b) Two single phase furnaces working at 100 V are connected to 3300 V, 3-phase mains through Scott connected transformers. Calculate the current in each line of the 3-phase mains when the power taken by each furnace is 400 kW at a power factor of 0.8 lagging. Neglect losses in the transformer.

