

### Assignments – Course Outcome matrix

**Course Outcomes (COs):**

CO-1 : Apply fundamental electrical laws and circuit theorems to electrical circuits.

CO-2 : Analyze single phase and three phase AC circuits.

CO-3 : Describe operating principle and applications of static and rotating electrical machines.

CO-4 : Understand the LT switchgear, earthing and safety of electrical appliances.

CO-5 : Comprehend illumination system, batteries, electrical consumption & billing and electrical measuring instruments.

Sr. No	Assignment	CO1	CO2	CO3	CO4	CO5
1.	Assignment-1	√				
2.	Assignment-2		√			
3.	Assignment-3			√		
4.	Assignment-4				√	
5.	Assignment-5					√

## Assignment : 3

1. Explain construction and working principle of a single-phase transformer with neat diagram.
2. Explain hysteresis and eddy current losses in transformer and methods to minimize them.
3. Define transformer losses and explain them in detail.
4. Define voltage regulation of transformer and explain its significance.
  
5. A steel ring has a mean length of 90 cm and cross-sectional area of 7 cm<sup>2</sup>. It has an air gap of 1 mm. If  $\mu_r$  of steel is 1500 and flux required is 1 mWb, calculate the total ampere turns required.
6. A ring with one air gap produces a flux of 0.6 mWb. If the air gap length is doubled, determine the new flux assuming MMF remains constant.
7. A coil is uniformly wound with 400 turns over a steel ring of relative permeability 750 and having mean diameter of 30 cm. The steel ring is made of a bar having cross-section of diameter 3 cm. If the coil has a resistance of 23  $\Omega$  and is connected to 230 V DC, calculate: (i) MMF, (ii) Field intensity, (iii) Reluctance, (iv) Total flux.
8. A steel ring of 25 cm mean diameter has circular cross-section of 3 cm diameter, has a gap of 1.5 mm length. It is wound uniformly with 700 turns of wire carrying a current of 2 A. Calculate: (a) MMF, (b) Flux density, (c) magnetic flux, (d) Reluctance, (e)  $\mu_r$  for iron
9. Calculate eddy current loss in a core if: Frequency = 50 Hz, Flux density = 1.2 Wb/m<sup>2</sup>, Thickness = 4 mm, Volume = 0.02 m<sup>3</sup>.
10. A 10 kVA, 230/115 V transformer supplies full load at 0.8 power factor. Calculate: (a) Primary current, (b) Secondary current
11. A transformer delivers 5 kW at 0.9 power factor. If losses are 600 W, determine the efficiency.
12. A transformer has equivalent resistance of 0.5  $\Omega$  and reactance of 1.2  $\Omega$  referred to secondary. If rated current is 10 A at 0.8 lagging power factor, calculate voltage regulation.
13. A practical transformer has efficiency of 95% at full load. If output is 4 kW, calculate total losses.

**Rubric wise marks obtained:**

Criteria	Level of Knowledge and Understanding	Analytical Ability	Quality & Correctness of Write-up, Ethical Practices and Submission	Total
<b>Marks</b>				