



Department of Electrical and Electronic Engineering

Level-2, Term-I

Mid Term Examination, Spring-2023

Course Code: EEE 213

Course Title: Energy Conversion I

Notes:

Time: 1 Hour

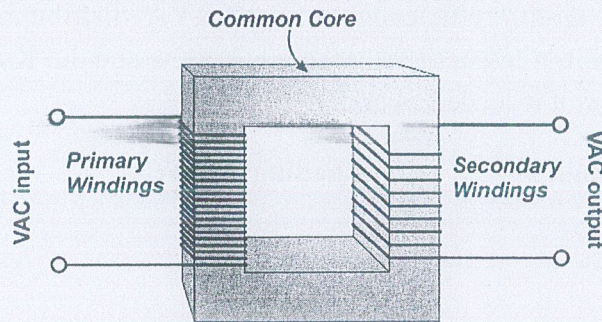
a. Each question carries 30 marks.

Full Marks: 60

b. Figure on the right of each question indicate marks for respective question.

c. Answer any TWO (2) including Question ONE (1)

1. i. Convert the transformer shown in figure 1(i) into an equivalent circuit and illustrate [15]
the vector diagram of a leading transformer.



- ii. A single-phase power system consists of a 480v, 60 Hz generator supplying a load [10]
 $Z_{load} = 4 + j3\Omega$ through a transmission line of impedance $Z_{line} = 0.18 + j0.24\Omega$.

- a) If the power system is exactly as described in figure 1(ii) (a). Determine the
voltage at the load side and calculate the transmission line losses.

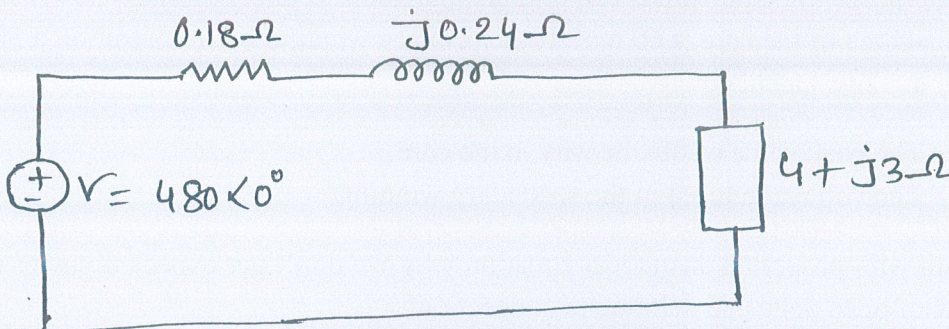


Figure 1(ii)(a)

- b) Suppose a 1:10 step up transformer is placed at the generator end of the transmission line and a 10:1 step down transformer is placed at the load end of the line shown in figure 1(ii) (b). What will the load voltage be now? What will the transmission line losses be now?

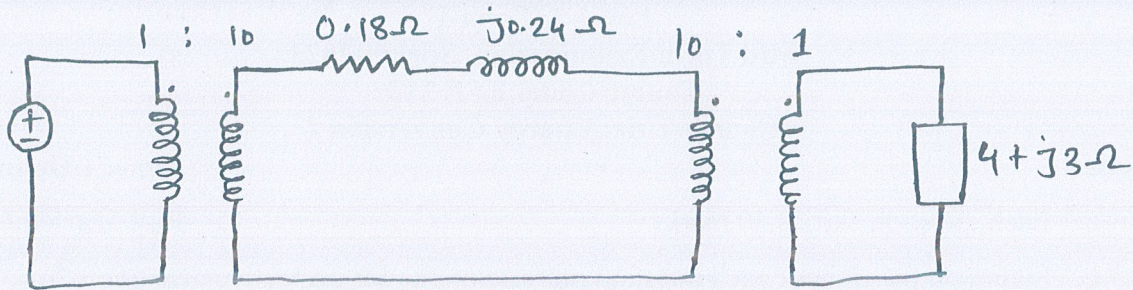


Figure 1(ii)(b)

- iii. State regulation of a transformer. Discuss the conditions of parallel operation [05]
2. i. Describe instrument transformer. In which condition you will get core loss = copper loss. [10]
- ii. Determine the all-day efficiencies of 500 KVA distribution transformer whose copper loss and iron losses at full load are 4.5 Kw and 3.5 Kw respectively. During a day of 24 hour, it is loaded as under: [15]

No. of hours	Loading in KW	Power Factor
7	400	0.8
9	300	0.75
5	100	0.8
3	0	-

- iii. Define ideal transformer. State the losses of a transformer [05]
3. i. A single-phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60 cm². If the primary winding be connected to a 50 Hz supply at 520v. calculate [15]
- The peak value of flux density in the core.
 - The voltage induced in the secondary winding.
- ii. Explain with proper mathematical equation why we don't get expected power ratio in case of open delta and delta-delta connection [15]