

Date: 18th March

Time: 0930 -1230

This paper consists of two parts: Part A and Part B.

Part A contains three questions and Part B contains four questions.

Answer any two (2) questions from Part A and any three (3) questions from part B.

PART A

Question (1)

- Sketch the voltage-current characteristics of Si and Ge semiconductor diodes.
- Explain how you distinguish real diode from ideal diode
- A voltage having a triangular wave form shown in figure 1(a) is applied to the biased parallel clipper circuit of figure 1(b). Draw the output voltage waveform. (assume that diodes are ideal).

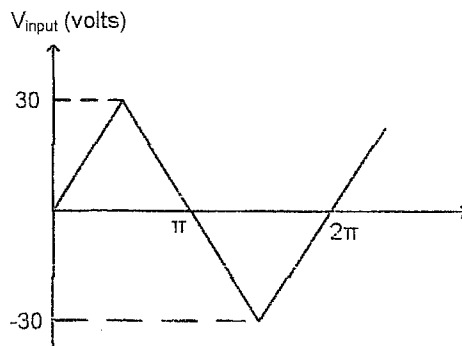


Figure 1(a)

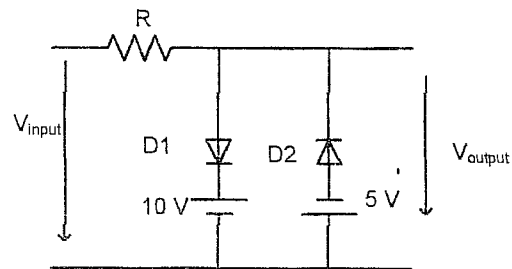


Figure 1(b)

Question (2)

The maximum flux density through the core of a single phase 240/3000 V, 50 Hz transformer is 1.25 Wb/m^2 . Induced emf per turn is 8 volts.

Find:

- Net cross sectional area of the core
- Number of turns in primary and secondary windings

Question (3)

Briefly explain the reasons for following statements:

- The rating of residual current circuit breaker (RCCB) used in houses is 30 mA, but the ratings of RCCB used in industries are 100 mA or 300 mA.
- The number of turns in primary side of the current transformer is one or ten.

PART (B)

Question (4)

A single phase 600 m long ac distributor has a total impedance of $0.03+j0.06 \Omega$ and the sending end voltage is 250 V. The distributor is loaded as follows:

- i. 50 A at unity power factor 200 m from feeding point.
- ii. 100 A at 0.8 power factor lagging 400 m from feeding point.
- iii. 50 A at 0.6 power factor lagging at the far end.

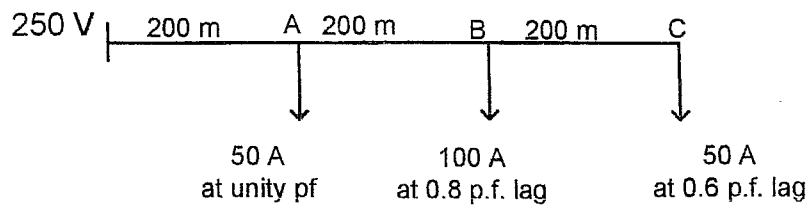


Figure 2

Calculate voltages at points A,B and C and voltage regulation.

Question (5)

- a. What are the requirements that should be satisfied for the optimum parallel connection of two three phase transformers?
- b. Explain the meaning of term 22-Dd-6 with respect to three phase transformer and draw the inside winding diagram.
- c. The equivalent circuit parameters of a single phase 2300/230 V, 50 Hz transformer is given bellow:

$$R_1=0.286 \Omega; \quad R_2'=0.319 \Omega, \quad R_0=250 \Omega$$
$$X_1=0.73 \Omega; \quad X_2'=0.73 \Omega, \quad X_0=1250 \Omega$$

A load of $0.38+j0.29 \Omega$ is connected to the secondary side of the transformer and nominal voltage is maintained at the secondary.

Calculate input voltage, power and power factor.

Question (6)

- a. Briefly explain the different types of three phase standard type squirrel cage motors with sketches.
- b. How do you categorize the rotor, starting torque and starting current of above motors.
- c. Explain the starting methods of single phase induction motor.

Question (7)

- a. Explain why transformer rating is in kVA but motor rating is in kW.
- b. Calculate the ratio of the weights of copper for a single wounded auto transformer and an ordinary transformer when ratio is 0.75.
- c. An auto-transformer is used to transform from 500 V to 440 V. A load of 20 kW at unity power factor is connected across low voltage side. Calculate the currents though the windings (state any assumptions that you made).