



C23-EE-303

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BOARD DIPLOMA EXAMINATION, (C-23)
MARCH/APRIL—2025
DEEE – THIRD SEMESTER EXAMINATION
AC CIRCUITS AND TRANSFORMERS

Time : 3 Hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.
1. Define the terms (a) instantaneous value, (b) time period and (c) frequency of an alternating quantity.
 2. The equation of an alternating quantity is $i = 100\sin 314t$. Determine (a) RMS value and (b) average value.
 3. Define phase and phase difference of an alternating quantity.
 4. Write the instantaneous voltage and current equations in a pure capacitive circuit.
 5. Define resonance and give the equation for resonant frequency of a R - L - C series circuit.
 6. Define polyphase and list any three advantages of polyphase over single phase.

7. State the importance of phase sequence in three-phase system.
8. Distinguish between core type and shell type transformers in any three aspects.
9. List the losses in transformer.
10. State any three advantages of three-phase transformer over single-phase transformer.

PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
(2) Each question carries **ten** marks.
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. Derive impedance, phase angle, power and power factor in RL series circuit.
12. A resistance of $12\ \Omega$, an inductance of $0.15\ \text{H}$ and a capacitance of $100\ \mu\text{F}$ are connected in series across a $200\ \text{V}$, $50\ \text{Hz}$ supply. Calculate (a) impedance, (b) current, (c) power factor and (d) power consumed.
13. Derive the relation between phase and line voltages, phase and line currents for balanced 3-phase star connected system.
14. Explain the effect of load power factor on wattmeter readings in two-wattmeter method.
15. Derive the e.m.f equation of a single-phase transformer.
16. Draw the equivalent circuit diagram refers to primary for a $4\ \text{kVA}$, $200/400\ \text{V}$ and $50\ \text{HZ}$ $1\text{-}\Phi$ transformer from the test results as follows :
OC Test : $200\ \text{V}$, $0.8\ \text{A}$, $80\ \text{W}$ on LV side
SC Test : $20\ \text{V}$, $10\ \text{A}$, $100\ \text{W}$ on HV side

- 17.** State the need for parallel operation of three-phase transformers and also state the conditions for parallel operation of three-phase transformers.
- 18.** Draw a legible sketch of a power transformer and explain the function of each part.

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