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C23-EE–303

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BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2025

DEEE – THIRD SEMESTER EXAMINATION

AC CIRCUITS & 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 form factor & peak factor.

2. An alternating voltage is represented by $v = 353.5\sin\omega t$. Find the maximum value and RMS values of this voltage.

3. Perform the following operations :

(a) $A + B$

(b) $A - B$

Where $A = 2 + j5$, $B = 80 + j60$.

4. Define Q-factor for the series resonant circuits.

5. List the three methods for solving AC parallel circuits.

6. State any three advantages of polyphase system over single-phase system.

7. Write the expressions for three-phase EMFs.

8. Classify transformers based on number of phases and based on construction.

9. Draw the phasor diagram for an ideal transformer on NO load.

10. State the necessity of cooling of power transformers.

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 an expression for impedance, current, phase angle, power and power factor in single-phase R-L series AC circuits.

12. A circuit having a resistance of 5 Ω, an inductance of 0.4 H and a variable capacitance in series is connected across 110 Volts, 50 Hz frequency supply. Calculate the resonance condition *(i)* The value of capacitance, *(ii)* Current, *(iii)* Voltage across the inductance and *(iv)* Voltage across capacitance.

13. Derive the relation between phase and line voltages, phase and line currents for a 3-phase balance star circuit.

14. The power input to a 200 Volt, 50 Hz frequency, 3-phase motor running on full load at an efficiency of 90% is measured by two wattmeters which indicate 100 kW and 300 kW. Calculate *(i)* Power input, *(ii)* Power factor, *(iii)* Line current and *(iv)* HP output.

15. Explain the procedure for conducting short circuit (SC) test on a single-phase transformer.

16. Explain the working of transformer on load and draw the phasor diagram for a transformer on load working on lagging power factor.

17. Explain any two methods of cooling of a power transformer.

18. Draw the connection diagrams of the following :

(a) Star-Star

(b) Delta-Delta

(c) Star-Delta

(d) Delta-Star

Configuration of 3-phase transformers.

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