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C09–EE–303

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DEEE—THIRD SEMESTER EXAMINATION

ELECTRICAL CIRCUITS

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. State Kirchhoff's laws.

2. State Thevenin's theorem.

3. Define average value and RMS value.

4. Derive the relation between poles, speed and frequency.

5. Derive RMS value of full-wave rectified sine wave form.

6. Write the relation between voltage and current in pure capacitor and draw its vector diagram.

7. Draw the impedance triangle for an RL series circuit and give the formula for power factor in RL circuit.

8. Derive an expression for resonant frequency for an RLC series circuit.

9. List the advantages of polyphase system.

10. Write the relation between phase values and line values in star and delta connected systems.

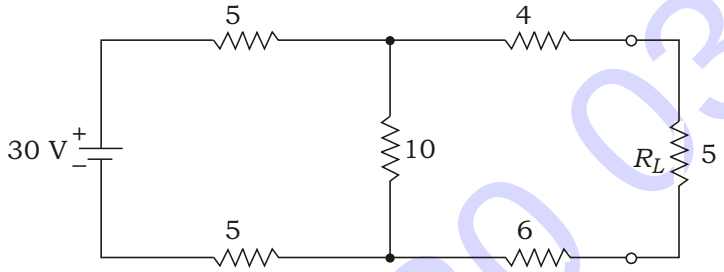
PART—B 10×5=50

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

11. *(a)* Write the relation for star to delta transformation. 5

(b) Explain the ideal voltage and ideal current source. 5

12. In the network shown below, calculate the current through load resistor by using Norton's theorem. 10



13. *(a)* State and explain maximum power transfer theorem. 6

(b) Perform the following operations and express the result in rectangular form : 4
(i) $A \quad B$, *(ii)* $A \quad B$, *(iii)* $A \quad B$ and *(iv)* A / B where $A \quad 4 \quad 3j$, $B \quad 6 \quad 8j$

14. Calculate the RMS value, average value, peak factor and form factor of sinusoidal voltage of maximum value of 200 volts. 10

15. A coil is connected in series with a 20 F capacitor across a 1- , 230 V, 50 Hz supply. The current taken by the circuit is 8 A and the power consumed is 200 W. Calculate the inductance of the coil if the power factor of the circuit is *(a)* leading and *(b)* lagging. 4+6

16. A coil having a resistance of 120 and an inductance of 80 mH is connected in parallel with a capacitor of 16 F in series with a resistance of 40 across 230 V, 50 Hz supply. Calculate power factor and power consumed by the circuit. 10

17. A coil of resistance 40 and inductance of 0·7 H forms part of RLC series circuit for which the resonant frequency is 60 Hz. Find the capacitance and also find *(a)* line current, *(b)* power factor and *(c)* voltage across the coil if the supply voltage is 250 V, 50 Hz. 10

18. A balanced 3-phase star-connected load of 100 kW taken a lagging current of 75 A with line voltage of 1000 V, 50 Hz. Find the circuit constants of load per phase and draw the vector diagram. 10

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