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C14–EE–303

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

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. Define an active circuit and draw an active circuit. 2+1

2. State the formulae to transform a delta network into a star network and vice versa. 3

3. Derive the relation among poles, speed and frequency. 3

4. Define *(a)* instantaneous value and *(b)* frequency. 3

5. Perform *(a)* $A \quad B$ *(b)* A / B where $A \quad 6 \quad j8$ and $B \quad 8 \quad j10$. 3

6. Define inductive reactance and write down the formula to calculate it. 1+2

7. Derive an expression for current flowing in *R-C* series circuit. 3

8. State the condition for parallel resonance and mention the formula for it. 1+2

9. List any three advantages of polyphase circuits. 3

10. Write down the relation between phase quantities and line quantities in a star network. 3

PART—B 10×5=50

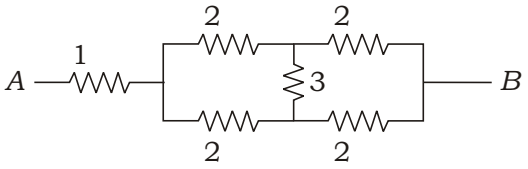
Instructions : (1) Answer *any* **five** questions.

(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)* State and explain Kirchhoff's laws. 5

(b) Find the equivalent resistance between the terminals *A* and *B*. 5



12. Two batteries having e.m.f's 80 V and 90 V with internal resistance of 0 2 and 0 22 respectively are connected in parallel. This combination is connected through 5 resistor to a 200 V DC supply. The positive poles of batteries being connected to the positive pole of the supply. Find *(a)* the magnitude and direction of current in each battery and *(b)* power dissipated in 5 resistor. 5+5

13. *(a)* State superposition theorem. 3

(b) State and explain maximum power transfer theorem. Also derive an expression for maximum power. 7

14. An alternating quantity is given by the expression i 50 sin 628 t. Determine *(a)* maximum value of current, *(b)* RMS value of current, *(c)* frequency, *(d)* value of the current after t 0 00625 second and *(e)* time taken by the current to reach a value of 20A from the initial position. 10

15. A current of 5 A flows through a non-inductive resistance in series with a coil when supplied at 250 V, 50 Hz. If the voltage across the resistance is 125 V and across the coil is 200 V, calculate *(a)* impedance of the coil (Z_{coil}), *(b)* reactance, *(c)* resistance of coil (R_{coil}), *(d)* p.f. of the coil and *(e)* total power consumed in the circuit. 10

16. Two impedances one inductive and the other capacitive are connected in series. A voltage of 120 30 V of frequency 50 Hz is impressed across the combination and the current flowing through the circuit is 3 15 A. If one of the impedances is (10 *j*48 3) , find *(a)* the value of capacitance in the circuit, *(b)* the value of inductance in the circuit and *(c)* the second impedance of the circuit. 10

17. An inductive coil is connected in parallel with a pure resistor of 30 and this parallel circuit is connected to 50 Hz supply. The total current taken by the circuit is 8 A, while the current in the resistor is 4 A and that of inductive coil is 6 A. Calculate *(a)* resistance and inductance of the coil, *(b)* p.f. of the circuit and *(c)* power taken by the circuit. 10

18. Three coils each having a resistance of 20 and inductive reactance of 15 are connected in star to a 3- , 400 V, 50 Hz supply. Calculate *(a)* line current, *(b)* power factor and *(c)* power consumed. 10

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