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C14–EE–303

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BOARD DIPLOMA EXAMINATION, (C–14)

SEPTEMBER/OCTOBER - 2020

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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Distinguish between active and passive circuits.

2. State the limitations of Ohm's law.

3. Define the terms *(a)* time period and *(b)* frequency.

4. Define the terms *(a)* RMS value and *(b)* form factor.

5. Write down the formulas of form factor and peak factor of half-wave rectified sine-wave.

6. Derive the relationship between voltage and current in a pure resistive circuit.

7. Define the terms *(a)* inductance and *(b)* capacitance.

8. State the condition for resonance in a parallel circuit.

9. Draw the circuit diagram for measurement of 3-phase power in star by two-wattmeter method.

10. Write down the relation between phase and line parameters (voltage and current) in delta connected 3-phase system.

PART—B

10×5=50

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

(2) Each question carries **ten** marks.

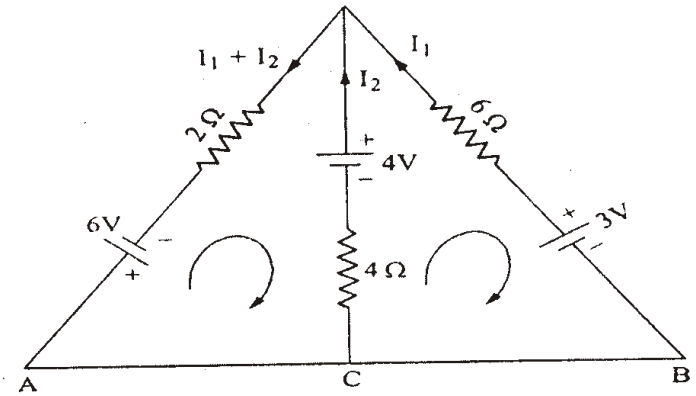
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Develop transformation formula from star to delta. 5

(b) Three resistances of 20 each connected in star. Find the equivalent in delta. If a source of e.m.f. of 120 V is connected across any two terminals of the equivalent delta connected resistances, find the current supplied by the source. 5

12. *(a)* State Kirchhoff's current law and Kirchhoff's voltage law. 3

(b) Find the values of I_1 and I_2 of the following circuit by using KVL : 7



13. *(a)* State the maximum power transfer theorem and derive the condition for maximum power transfer. 7

(b) State Thevenin's theorem. 3

14. *(a)* An alternating current is represented by the following equation :

$$i \quad 100 \sin (100 \quad t)$$

How long will it take for the current to attain values of 20, 50 and 100 A? 5

(b) A 50 Hz current has a peak amplitude of 100 A. Find the rate of change of current in ampere per second at time (t) where *(i)* t 0 0025 sec, *(ii)* t 0 005 sec and *(iii)* t 0 01 sec after i 0 and is increasing. 5

15. A series circuit consisting of 0·25 H inductance and a capacitance of 10 F. Find *(a)* impedance, *(b)* current and *(c)* power factor of the circuit, when connected to 230 V, 50 Hz AC supply. 10

16. *(a)* Derive the expression for resonant frequency in *R-L-C* series AC circuit. 5

(b) A resistance of 120 , an inductance of 0·15 H and a capacitance of 100 F are connected in series across a 100 V, 50 Hz supply. Calculate *(i)* current and *(ii)* impedance. 5

17. A series circuit consisting of coil having a resistance of 30 ohms and inductance of 0·5 H and a capacitor, is resonate at a frequency of 48 Hz. Calculate the capacitance of capacitor which when connected in parallel with this circuit will increase the resonant frequency to 60 Hz. 10

18. *(a)* Three coils each of resistance of 10 and inductance of 30 mH are connected in star across 400 V, 3 Ph, 50 Hz, a.c. supply mains. Calculate the current drawn in each line, power factor of the circuit. 5

(b) A balanced 3-phase, delta-connected load had per phase impedence of (25 *j*40) . If 400 V, 3 Ph, 50 Hz, AC supply is connected to this load, find *(i)* phase current and *(ii)* line current. 5

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