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C09–EC–306

3238

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2018

DECE—THIRD SEMESTER EXAMINATION

CIRCUIT THEORY

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 a.c. and d.c.

2. Define bandwidth and selectivity of a resonant circuit.

3. State the phase relationship between voltage and current for the following components :

(a) Resistor

(b) Capacitor

(c) Inductor

4. Define driving point impedance and transfer impedance.

5. State Kirchhoff's current law and voltage law.

6. Define superposition theorem.

7. Define Norton's theorem.

8. Draw a high pass *R-C* circuit.

9. Define time constant of series *R-C* circuit.

10. Two coils connected in series having an equivalent inductance of 0·8 H when connected in aiding and equivalent inductance of 0·5 H when connected in opposing. Calculate the mutual inductance of the coils.

PART—B

10×5=50

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

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

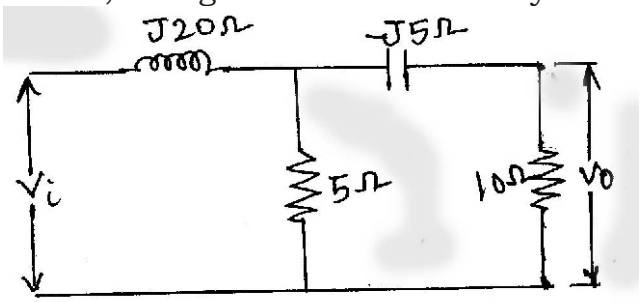
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Distinguish between series resonance and parallel resonance. 4

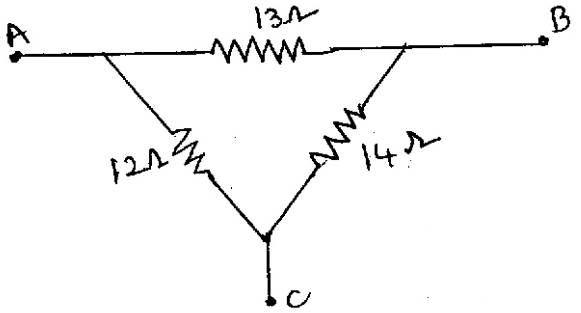
(b) Derive the expression for the resonant frequency of a series *R-L-C* circuit and write the expressions for current and impedance at resonance. 6

12. A capacitor having a capacitance of 10 F is connected in series with a pure resistance of 120 across a 100-V, 50-Hz supply. Calculate *(a)* current *I*, *(b)* phase angle , and *(c)* power consumed.

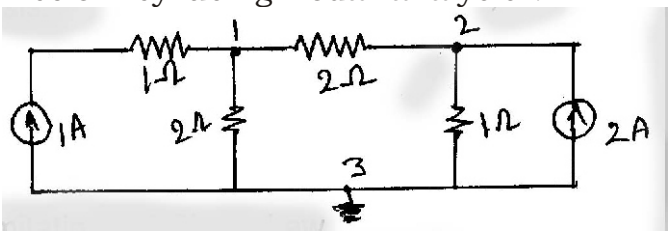
13. *(a)* Find the voltage transfer function V_o / V_i for the circuit shown below, using mesh current analysis : 6



(b) Obtain the star equivalent circuit for the delta connected circuit shown below : 4

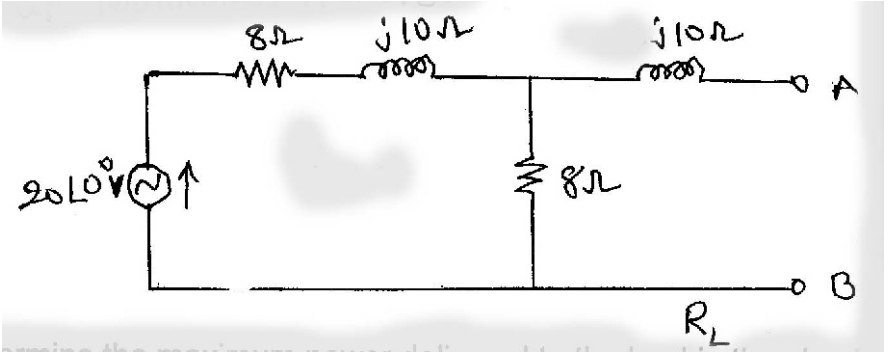


14. *(a)* Determine the voltage at nodes 1 and 2 of the network shown below by using nodal analysis : 6

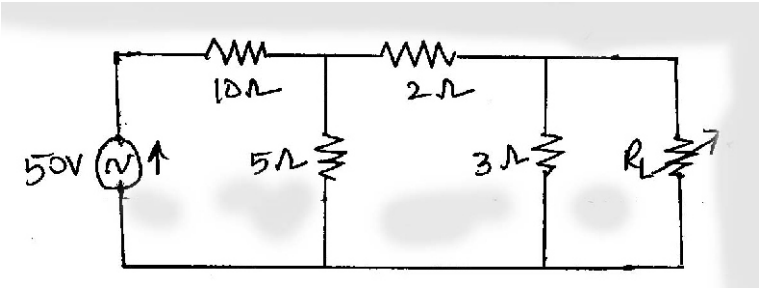


(b) Write the limitations of Ohm's law. 4

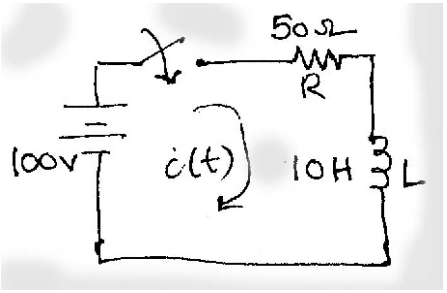
15. Obtain Thevenin's equivalent circuit for the circuit shown below at terminals *A* and *B* : 10



16. Determine the maximum power delivered to the load R_L in the circuit shown below : 10



17. *(a)* A series *R-L* circuit with R 50 and L 10 H has a constant voltage V 100 volts applied at t 0 by closing a switch. Find the expression for current $i(t)$: 5



(b) Draw the response of a low-pass *R-C* circuit for a square wave input with different time constants. 5

18. *(a)* Explain that a high-pass *R-C* circuit works as a differentiator. 5

(b) Explain the reflected impedance significance in coupled circuit and give the expression for the reflected impedance. 5

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