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C09–EC–306

3238

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2013

DECE—THIRD SEMESTER EXAMINATION

CIRCUIT THEORY

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

PART—A

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. Distinguish between active and passive elements.

2. Define RMS value and average value.

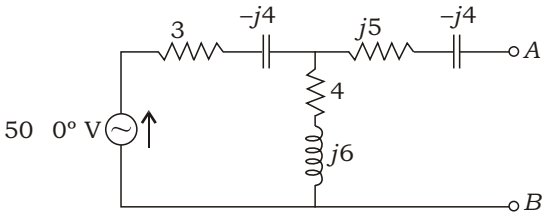
3. Distinguish between series and parallel resonant circuits.

4. Define driving point admittance and transfer admittance.

5. Give the mathematical equation for star to delta and delta to star transformations.

6. State superposition theorem and mention its limitations.

7. For the circuit shown below, determine the Thevenin's equivalent between the output terminals *A* and *B* :



8. Define coefficient of coupling and optimum coupling.

9. Define steady and transient response.

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

PART—B

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

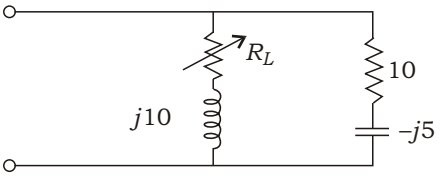
(2) Each question carries **ten** marks.

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

11. *(a)* Obtain the expression for current of series *R-L* circuit with a.c. source.

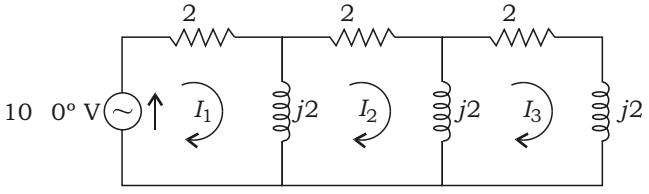
(b) A series *R-L-C* circuit with *R* 100 , *L* 0·5 H and *C* 40 F. Calculate the resonant, lower and upper half-power frequencies.

12. *(a)* Find the value of R_L for which the parallel circuit shown below is resonant :

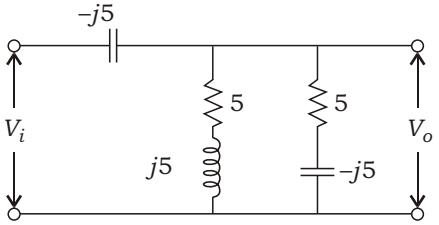


(b) Derive the expression for selectivity in terms of bandwidth and *Q*-factor.

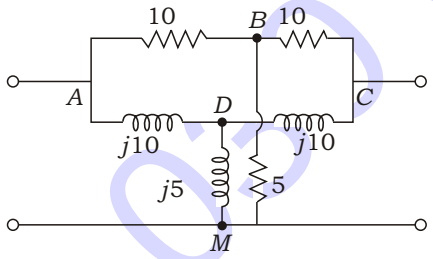
13. Find the three mesh currents I_1, I_2 and I_3 using driving point impedance and transfer impedance for the network below :



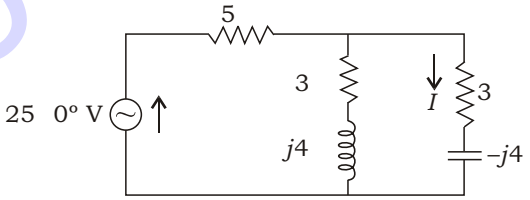
14. *(a)* Find the voltage transfer function V_o / V_i by the nodal method for the network shown below :



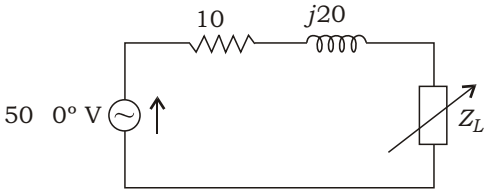
(b) Obtain the single delta connected equivalent circuit for the network shown below :



15. *(a)* Find the current I in the (3 $j4$) impedance. Apply reciprocity theorem and compare between the two currents from the following :

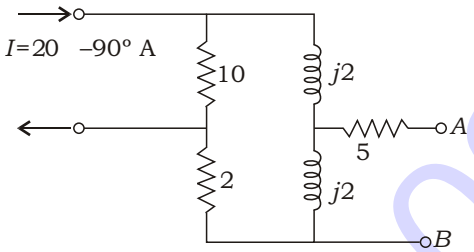


(b) In the circuit shown below, determine the value of Z_L which results in maximum power transfer and calculate the value of maximum power :



16. *(a)* State and explain Norton's theorem.

(b) Apply the Thevenin's theorem to find the power in an impedance Z 10 60° connected to terminals AB of the network shown in the figure below :



17. *(a)* Define reflected impedance of a coupled circuit.

(b) Derive the expression for lower 3 dB frequency of high-pass R-C circuit.

18. *(a)* A series R-L circuit with R 50 and L 0·2 H has a sinusoidal voltage source V 150 sin(500t) volts applied at a time when 0°. Find the complete current.

(b) Explain how high-pass R-C circuit works as a differentiator.

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