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Question Paper Code : 71496

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Electrical and Electronics Engineering

EE 2151/ EE 25/EE 1151/ 080280005/10133 EE 205 — CIRCUIT THEORY

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

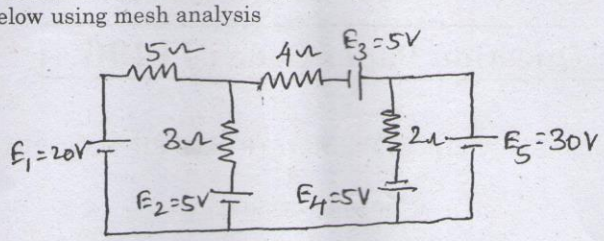
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's voltage law.
2. What are the three types of power used in a.c circuit?
3. Write the current division rule.
4. What are the limitations of maximum power transfer theorem?
5. Define quality factor Q of a coil.
6. Sketch the frequency response of double tuned circuit.
7. What is meant by the term time constant for series RL and RC circuit?
8. What do you mean by steady state value?
9. What are the advantages of three phase system?
10. Define line voltage and line current.

PART B — (5 × 16 = 80 marks)

11. (a) Determine the current supplied by each battery in the circuit shown below using mesh analysis



Or

(b) Use nodal voltage method to find the voltages of nodes 'm' and 'n' and currents through $j2\Omega$ and $-j2\Omega$ reactance in the network of figure 11(b)

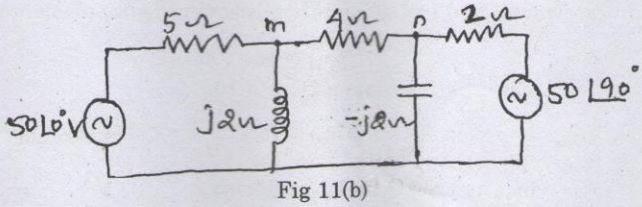
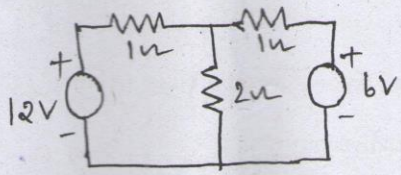


Fig 11(b)

12. (a) (i) Determine the current through the 2Ω resistor in the following network using Thevenin's theorem. (8)



(ii) In the Wheatstone bridge circuit of figure Q12(ii) find the effective resistance between PQ. Find the current supplied by a 10 V battery connected to PQ (8)

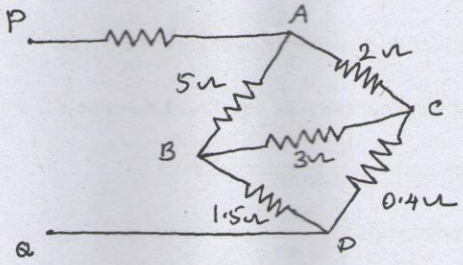
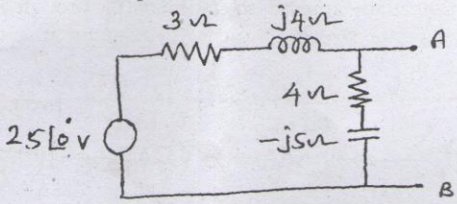


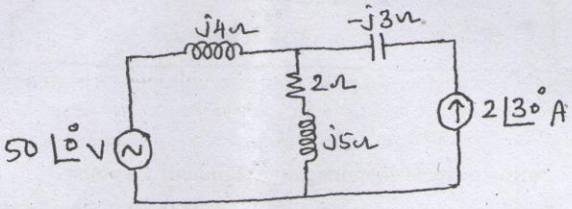
Fig Q12(ii)

Or

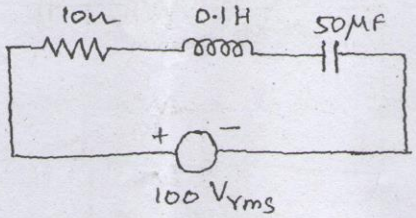
(b) (i) For the circuit shown, determine Norton's equivalent circuit between the output terminals AB (8)



(ii) Verify superposition theorem for the $(2+j5)\Omega$ impedance. (8)



13. (a) (i) For the circuit shown below, determine the frequency at which the circuit resonates. Also find the voltage across the inductor at resonance and the Q factor of the circuit. (8)



(ii) The number of turns in two coupled coils are 500 turns, 1500 turns respectively. When 5A current flows in coil 1, the total flux in this coil is 0.6×10^{-3} wb and the flux linking the second coil is $0.3\times10^{-3}wb$. Determine L_1, L_2, M and K. (8)

Or

(b) (i) A coil having an inductance of $100mH$ is magnetically coupled to another coil having an inductance of $900mH$. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance if the two coils are connected in

(1) Series aiding

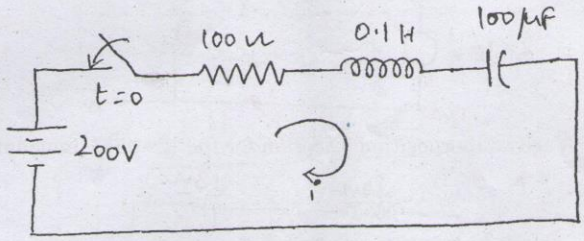
(2) Series opposing

(3) Parallel aiding

(4) Parallel opposing. (8)

(ii) What are coupled circuits? Sketch the frequency response of a single tuned circuit and give the application of tuned circuits. (8)

14. (a) A series RLC circuit with $R = 100\ \Omega$, $L = 0.1\ H$ and $C = 100\mu F$ has a DC voltage of 200 volts applied to it at t = 0 through a switch. Find the expression for the transient current. Assume initially relaxed circuit conditions.



Or

(b) (i) Define natural response and transient response. (4)

(ii) In the circuit shown in figure.Q14b(ii) find the time when the voltage across the capacitor becomes 25 V, after the switch is closed at t = 0. (12)

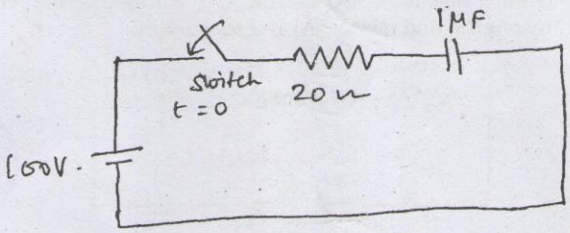


Fig Q 14b(ii)

15. (a) Define power, power factor. Explain the two Wattmeter method of measuring power in 3-phase circuits with neat sketch.

Or

(b) Derive the current, voltage and power equation for the star connection system and delta connection system.

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