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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91433

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

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

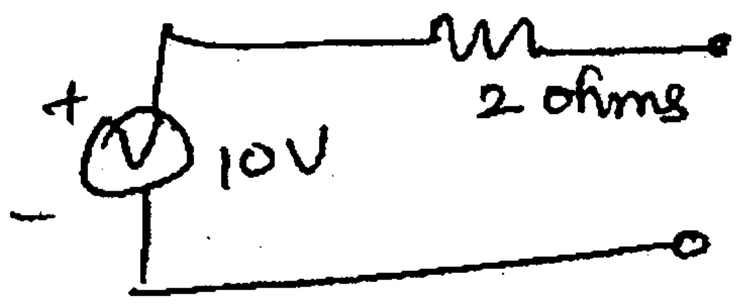
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ohm's law.

2. Write the expressions for mesh current equations in matrix form.

3. Draw the equivalent current source transformation circuit for the following circuit.



4. State reciprocity theorem.

5. What is called bandwidth of the circuit?

6. Define coefficient of coupling.

7. Write any two advantages of laplace transformation.

8. Write the expression for the laplace transformation of sine function, $(\sin \omega t)$.

9. When the load is balanced, what is the amount of current in the neutral wire for a 3 phase 4 wire system?

10. Write the expression for three phase total power.

PART B — ($5 \times 16 = 80$ marks)

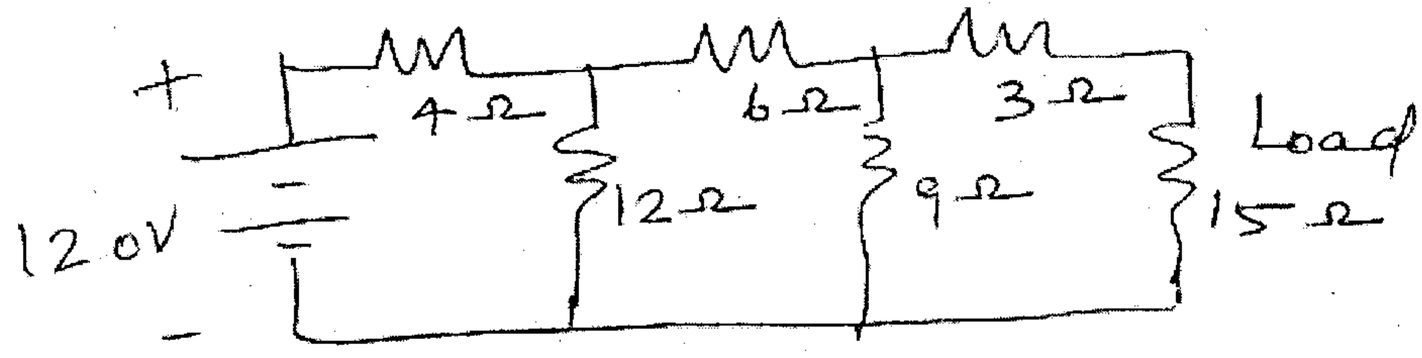
11. (a) (i) Derive the expressions for resistors in series and parallel. (8)

(ii) Two 50 ohms resistors are connected in series. When a resistor R is connected across one of them, the total circuit resistance is 60 ohms. Calculate the value of R. If the supply voltage across the above circuit is 60V, find the current passing through individual resistance. (8)

Or

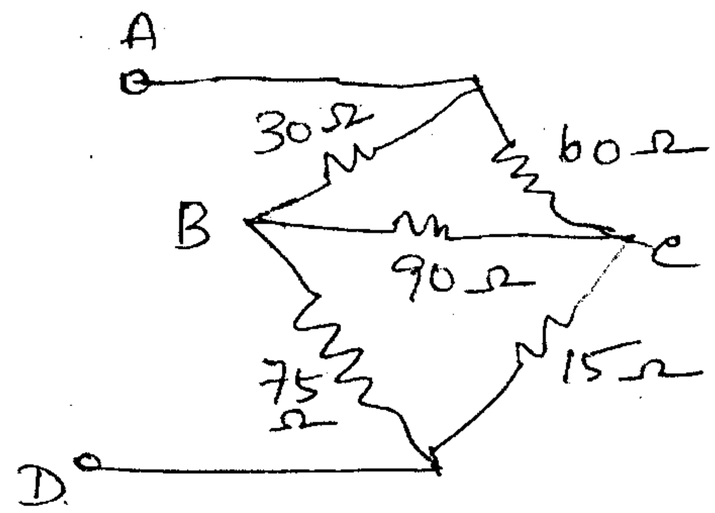
(b) (i) Define and explain Kirchoff's laws. (8)

(ii) In the circuit given below, obtain the load current. (8)



12. (a) (i) Explain the conversion from a star circuit to delta circuit. (8)

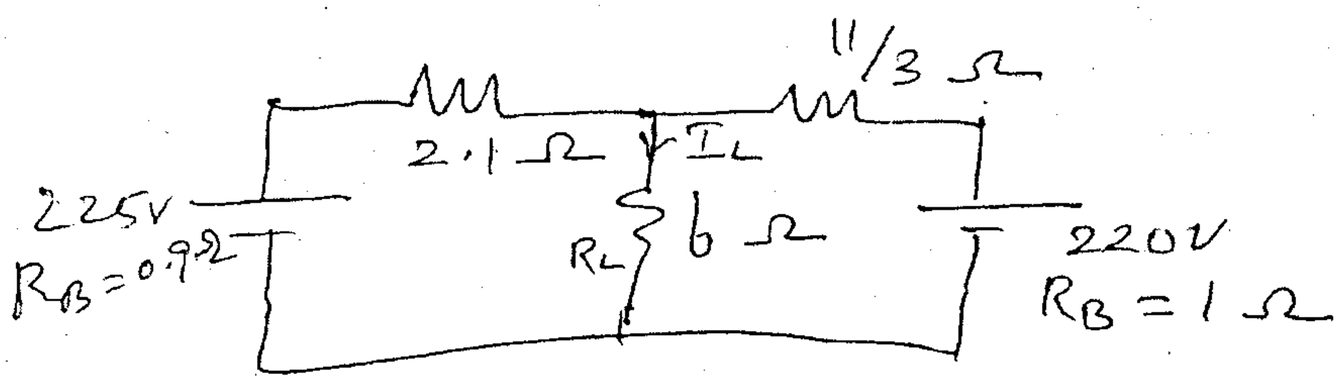
(ii) In the circuit given below, obtain the equivalent resistance at AD. (8)



Or

(b) (i) State and explain superposition theorem. (6)

(ii) Find the load current I_L, the load voltage V_L and load power P_L by the principle of super position theorem in the following circuit. (10)



13. (a) For a series RLC circuit

(i) derive the condition for resonance

(ii) explain the frequency response and

(iii) obtain quality factor and bandwidth. (16)

Or

(b) Discuss the following :

(i) Co-efficient of coupling. (8)

(ii) Tuned circuit. (8)

14. (a) (i) Derive the expression for transient current for an RL series circuit connected to a battery through a switch. (10)

(ii) A series RL circuit with R = 100 ohms and L = 20 H has a D.C. voltage of 200 volts applied through a switch at t = 0. Find the equation for the current and voltages across the different elements. (6)

Or

(b) A series RL circuit with R = 100 ohms and L = 1 H has a sinusoidal voltage source $200\sin(500t+\phi)$ applied at a time when $\phi = 0$. (i) find the expression for the current. (ii) at what value of angle ϕ must the switch be closed so that the current directly enters the steady state. (16)

15. (a) Explain power and power factor measurements in three phase circuits by two wattmeter method. (16)

Or

(b) (i) A 3 phase 400 volts supply is given to a balanced star connected load of impedance 8 + jb ohms in each branch. Find the line current, power factor and total power. (8)

(ii) Derive the relationship between the phase voltage and line voltage of a 3 phase star connected balanced system. (8)