**BE Semester-III (I. C.) Question Bank**

**Subject : Circuit Theory (IC-302)**

**All questions carry equal marks (10 marks)**

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| Q.1 | Define the following terms: 1) Network 2) Network element 3) Branch 4) Mash or loop 5) Node |
| Q.2 | Explain the concept of source transformation with suitable example. |
| Q.3 | What is signification of initial conditions? Write a note on initial conditions in basic circuit elements. |
| Q.4 | Explain the following network definition.<br>1) Linearity 2) Lumped & distributed networks<br>3) Active & passive network 4) Unilateral and Bilateral network |
| Q.5 | State and Explain the initial condition for resistor, inductor and capacitor at t = 0+ and t =0- time. |
| Q.6 | State & explain the Reciprocity theorem with suitable example. |
| Q.7 | Give difference between f-circuit and f-cutsets with suitable example. |
| Q.8 | Derive relationship between H parameter and ABCD parameter. |
| Q.9 | Explain the significance of poles and zeros. |
| Q.10 | Derive the condition of symmetry and reciprocity for Y-parameters. |
| Q.11 | Derive relationship between Z parameter and H parameter. |
| Q.12 | Explain concept of Duality with example. |
| Q.13 | Explain the concept of complex frequency. Also discuss the significance of complex frequency. |
| Q.14 | Derive relationship between Y parameter and H parameter. |
| Q.15 | Explain Norton's theorem with suitable example. |
| Q.16 | Explain Thevenin's theorem with suitable example. |
| Q.17 | Explain Superposition theorem with suitable example. |
| Q.18 | For the circuit shown in the fig., find node voltages $V_1$, $V_2$ and $V_3$ using node analysis. |

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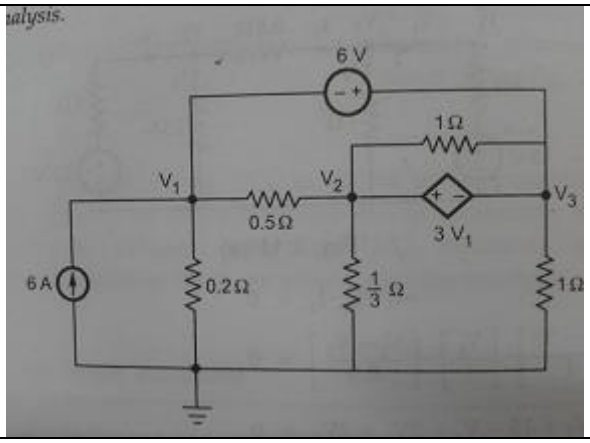
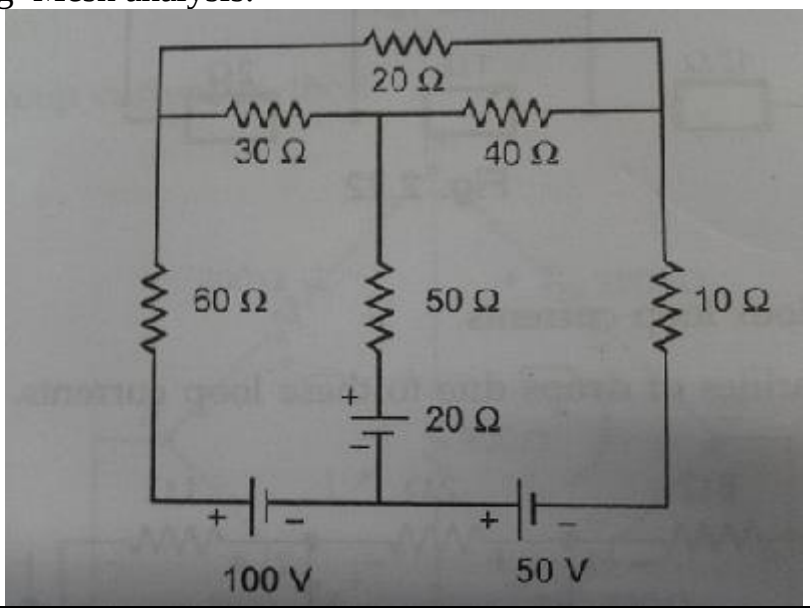
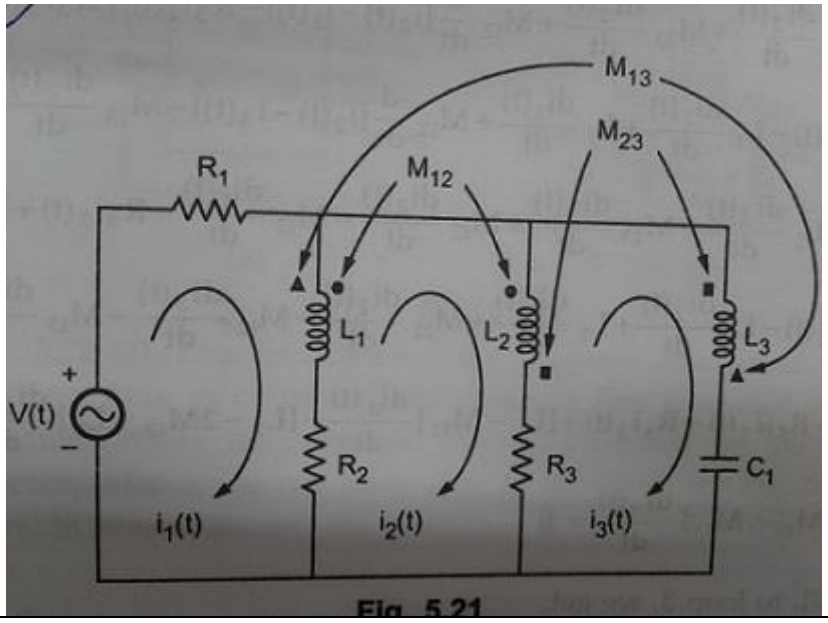
| |  |
| Q.19 | Calculate the current in the 50 Ω resistor in the network shown in the fig. using Mesh analysis.<br>  |
| Q.20 | Write the loop equations for the coupled circuit shown in the fig.<br>  <br>Fig. 5.21 |

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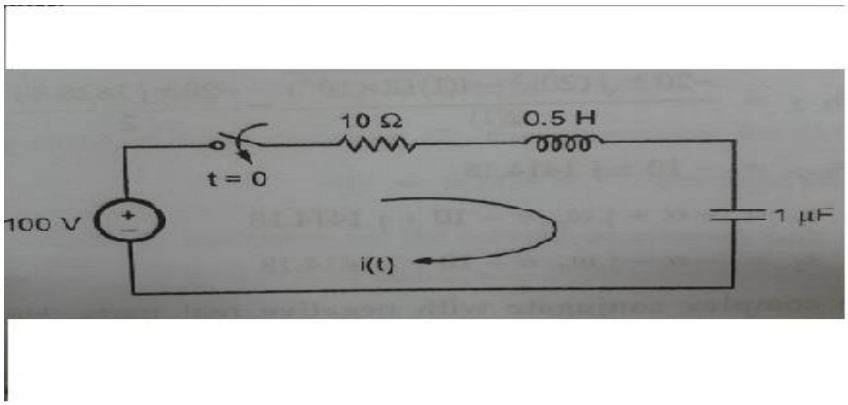
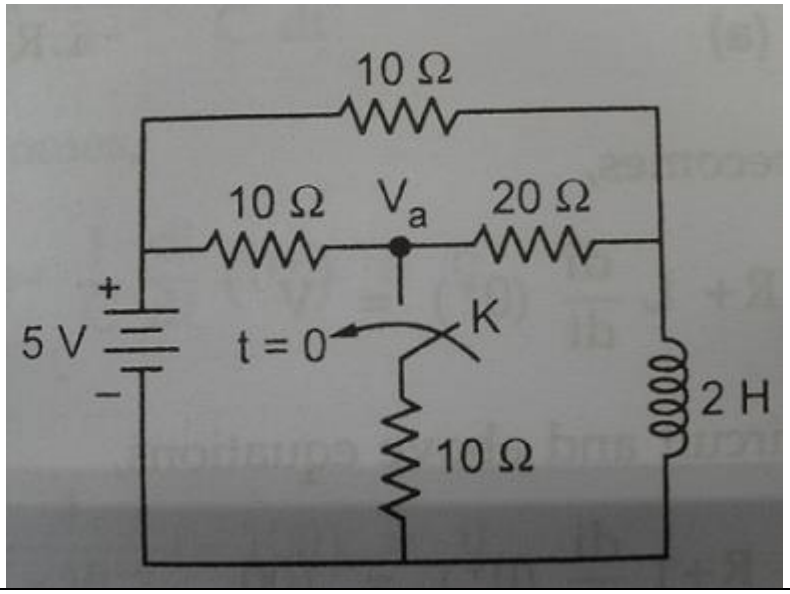
| Q.21 | In the circuit shown in the fig., switch is closed at t = 0, find i , di/dt , $d^2i/dt^2$ at t = 0+.<br>  <br> |
| Q.22 | In the network shown in fig., steady state is reached with the switch K open, At t = 0, the switch is closed. For the element values shown determine values for Va (0-) and Va (0+).<br>  <br> |
| Q.23 | In the network shown switch is opened at t = 0, solve for v, dv/dt, $d^2v/dt^2$ for t = 0+. |

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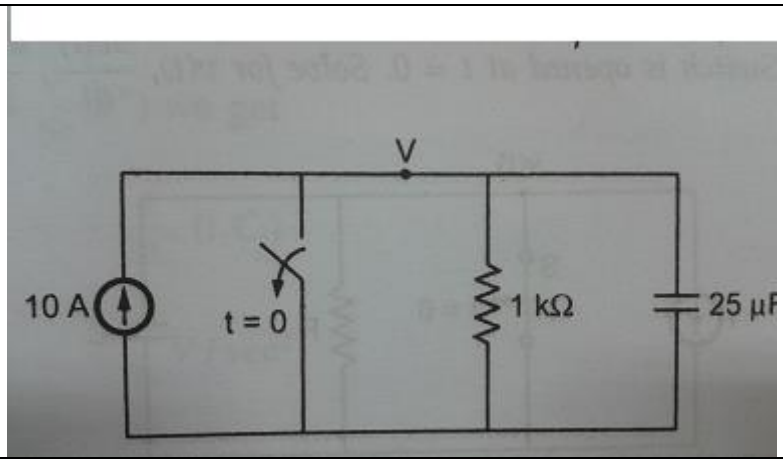
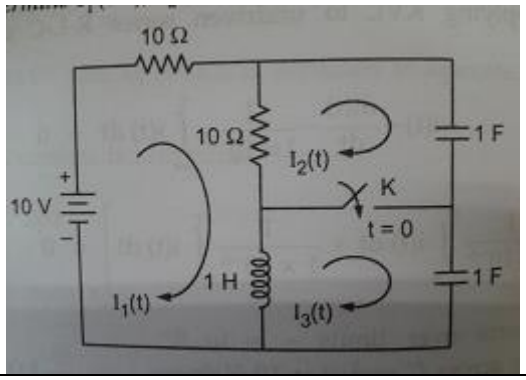
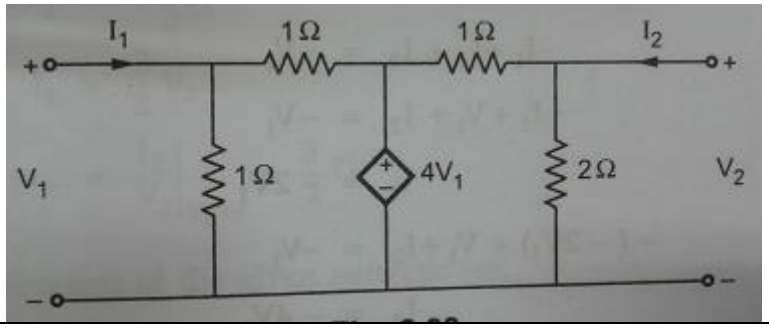
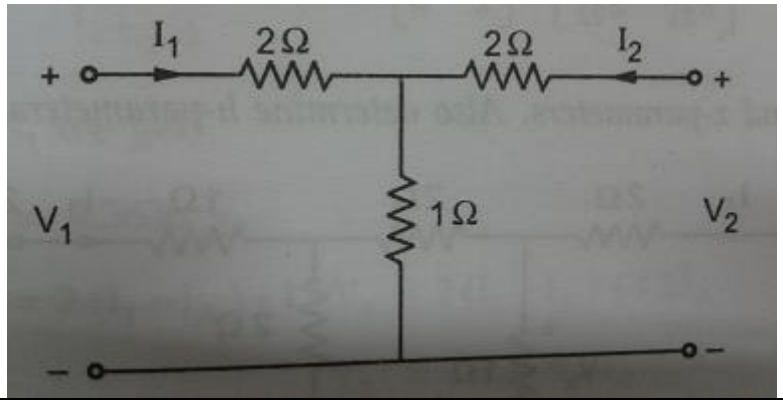
| |  |
| Q.24 | In the network shown steady state with the switch K is open. At t = 0 switch is closed. Determine $I_1(0+)$, $I_2(0+)$, $I_3(0+)$<br>  |
| Q.25 | Find Y-parameters of the network shown in the fig.<br>  |
| Q.26 | Find Z-parameters of the network shown in the fig.<br>  |

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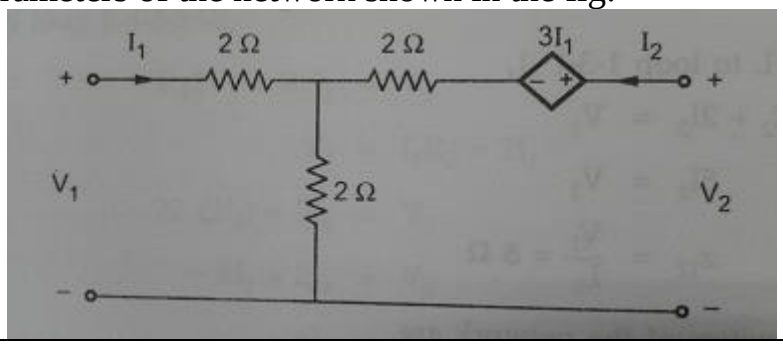
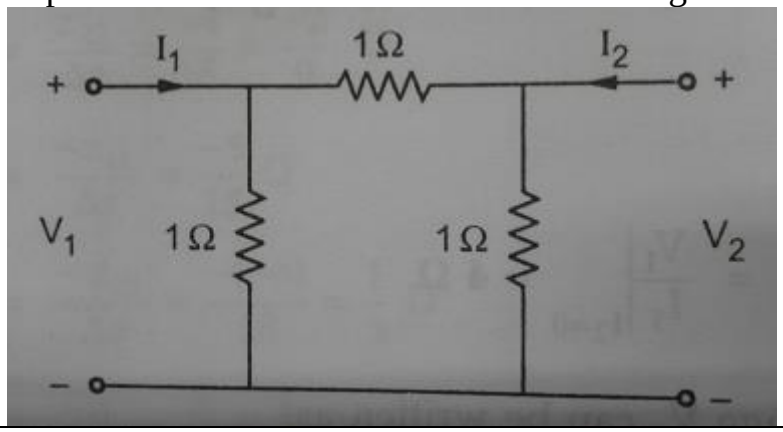
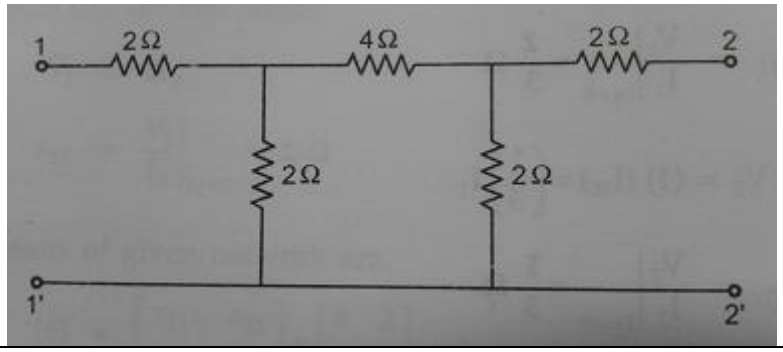
| Q.27 | Find Y-parameters of the network shown in the fig. |
| Q.28 | Find Z-parameters of the network shown in the fig.<br>  |
| Q.29 | Find ABCD-parameters of the network shown in the fig.<br>  |
| Q.30 | Find H-parameters of the network shown in the fig.<br>  |
| Q.31 | State and Explain the various types of special signal waveforms used in network analysis and their laplace transform. |
| Q.32 | Using Superposition theorem find $V_{AB.}$ |

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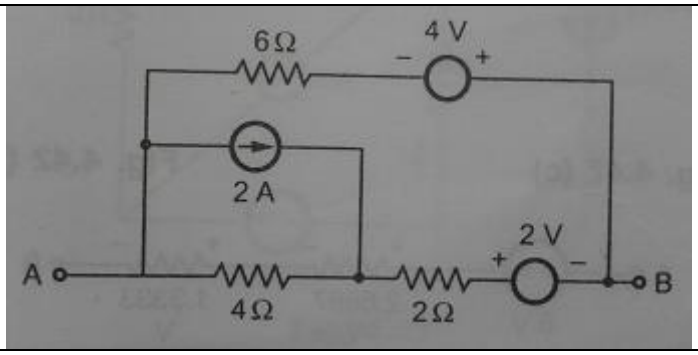
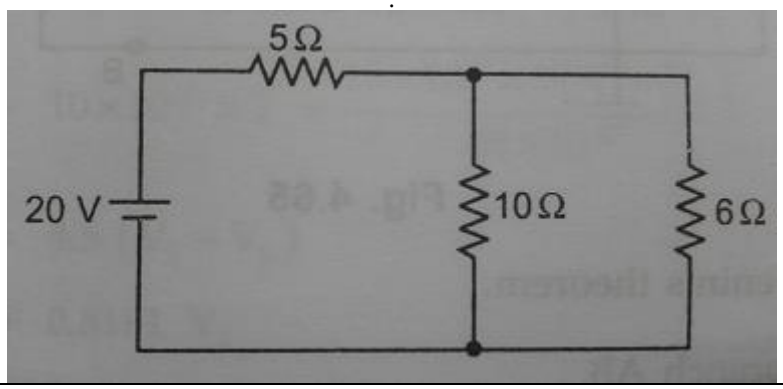
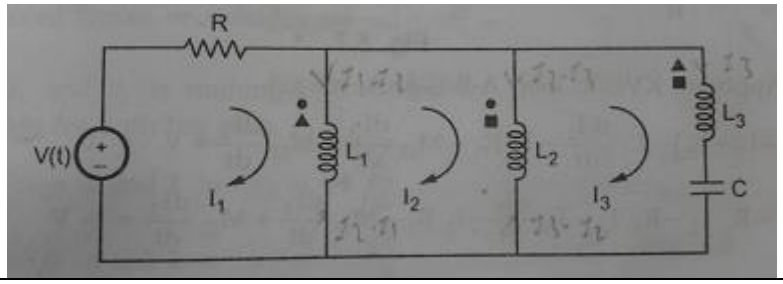
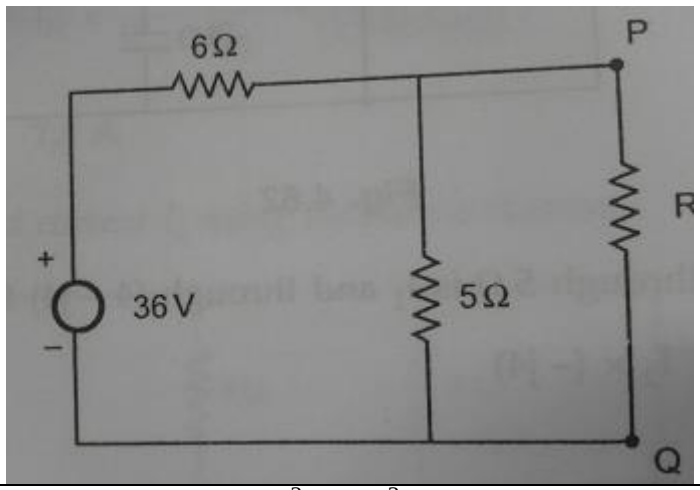
| |  |
| Q.33 | Using Nortan theorem find current through 6Ω resistance shown in fig.<br>  |
| Q.34 | Write loop equations for the circuit shown in the fig.<br>  |
| Q.35 | In fig., R absorbs maximum power. Find the value of R and the maximum power.<br>  |
| Q.36 | Solve the differential equation $d^2i(t)/dt^2 + 3di(t)/dt + 2i(t) = 4e^t$ where |

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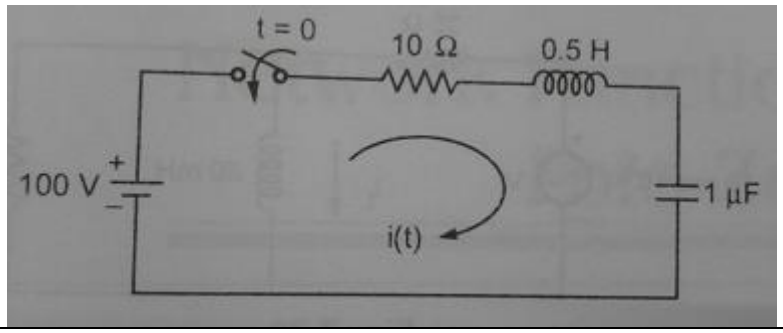
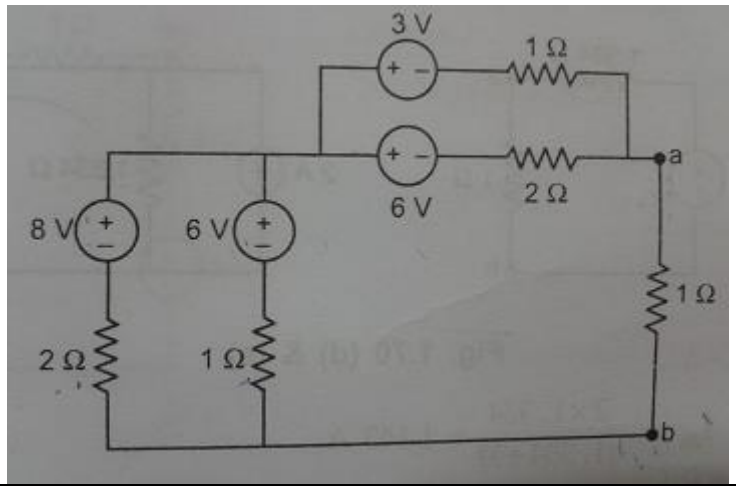
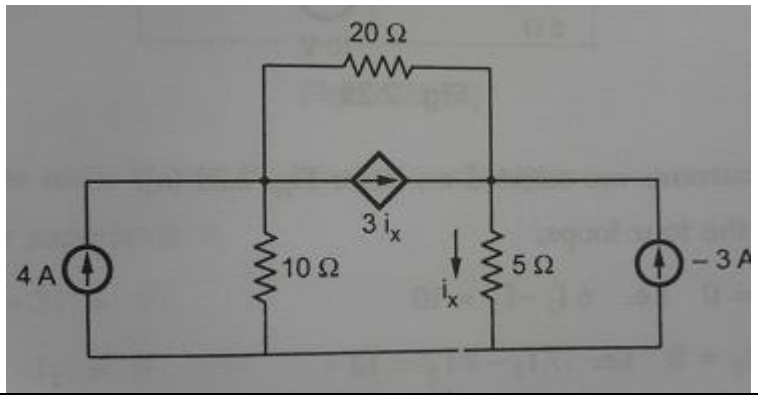
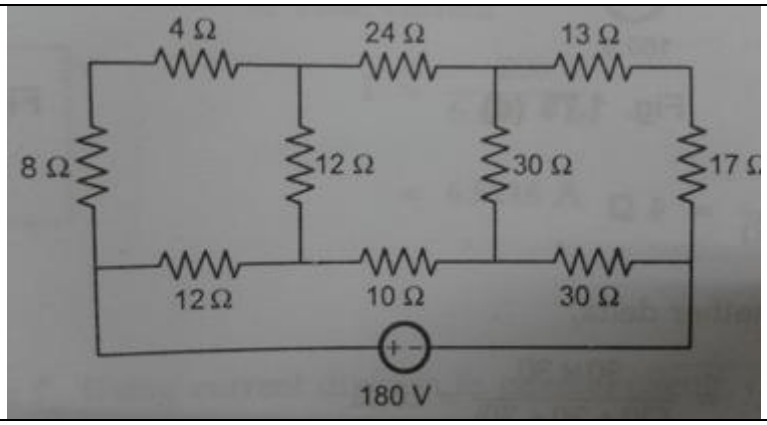
| | $i(0^-) = 1,\ i'(0^-) = -1$ using laplace transform. |
| Q.37 | Obtain current for $t \geq 0$ using laplace method.<br>  |
| Q.38 | Using source transformation ,find the voltage across 1Ω resistor between 'a' and 'b' shown in fig.<br>  |
| Q.39 | For the circuit shown, find the currents and voltages in all the branches using nodal analysis.<br>  |
| Q.40 | Determine the current through 10Ω resistance in the network shown in the fig. by star-delta conversion. |


4 Ω
24 Ω
13 Ω
8 Ω
12 Ω
30 Ω
17 Ω
12 Ω
10 Ω
30 Ω
+ −
180 V