KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

EE 202

EXAM I

DATE: Thursday 27/2/2014

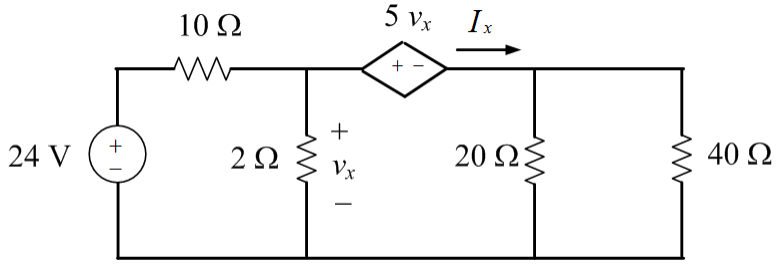
TIME: 6:00 PM-7:30 PM *

| | |
|---|---|
| **SER #** | |
| **ID#** | |
| **Name** | **KEY** |
| **Section#** | |

| | **Maximum Score** | **Score** |
|---|---|---|
| **Problem No 1** | **40** | |
| **Problem No 2** | **30** | |
| **Problem No 3** | **20** | |
| **Problem No 4** | **10** | |
| **Total** | **100** | |

**Problem No 1 (40)**

**(a)**

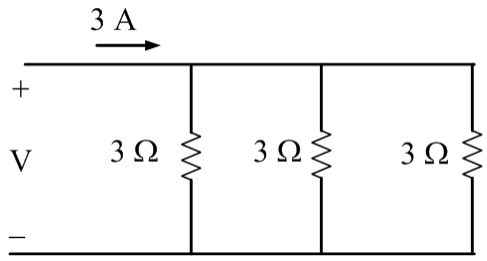



If $v_x = 8$ V , then the current $I_x$ is

(*i*) 1.6 A (*ii*) −1.6 A (*iii*) 2.4 A **(*iv*) −2.4 A**

(*v*) 3.6 A (*vi*) −3.6 A (*vii*) 5.6 A (*viii*) −5.6 A

**(b)**

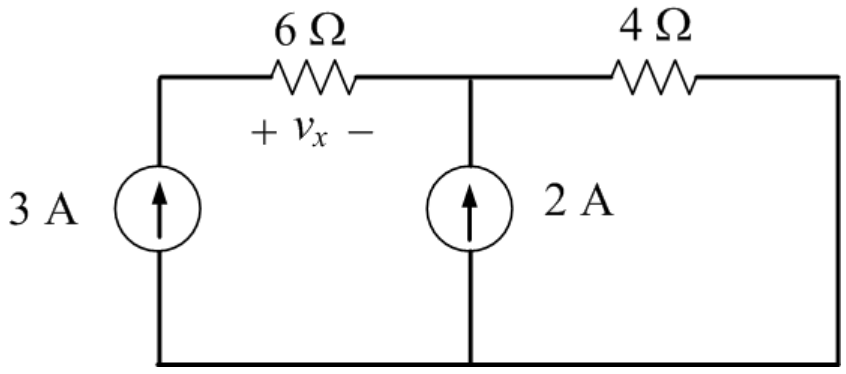



For the circuit shown above, the voltage V is

**(*i*) 3 V** (*ii*) −3 V (*iii*) 9 V (*iv*) −9 V

(*v*) 27 V (*vi*) −27 V (*vii*) 1 V (*viii*) −1 V

**(c)**

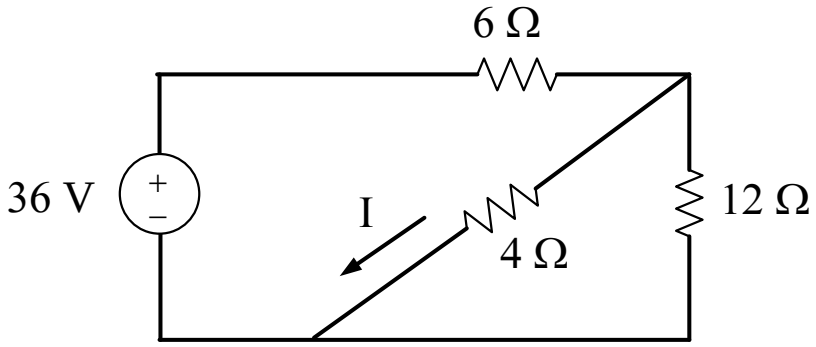



For the circuit shown above, the voltage $v_x$ is

(*i*) 30 V (*ii*) −30 V (*iii*) 6 V (*iv*) −6 V

(*v*) 12 V (*vi*) −12 V **(*vii*) 18 V** (*viii*) −18 V

**(d)**

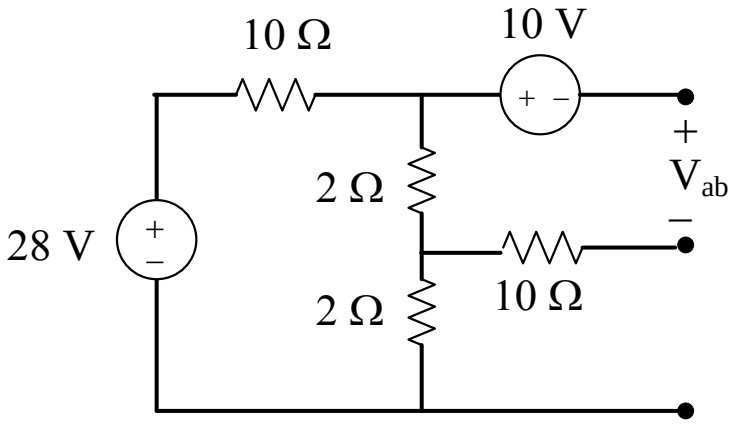



For the circuit shown above, the current I is

(*i*) 1 A (*ii*) −1 A (*iii*) 4 A (*iv*) −4 A

**(*v*) 3 A** (*vi*) −3 A (*vii*) 2 A (*viii*) −2 A

**(e)**

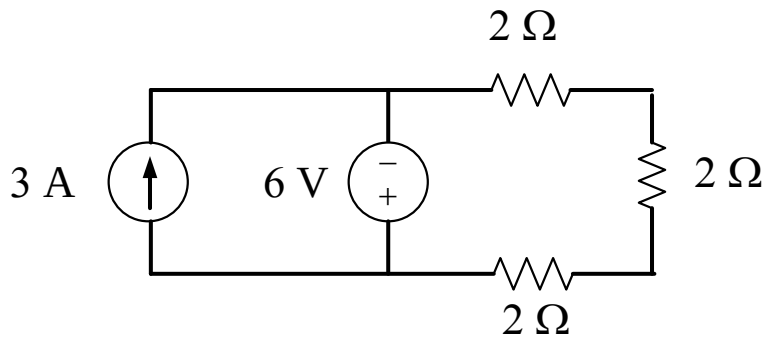



For the circuit shown above, the voltage $V_{ab}$ is

(*i*) 4 V (*ii*) $-4$ V (*iii*) 10 V (*iv*) $-10$ V

(*v*) 6 V **(*vi*) $-6$ V** (*vii*) 5 V (*viii*) $-5$ V

**(f)**

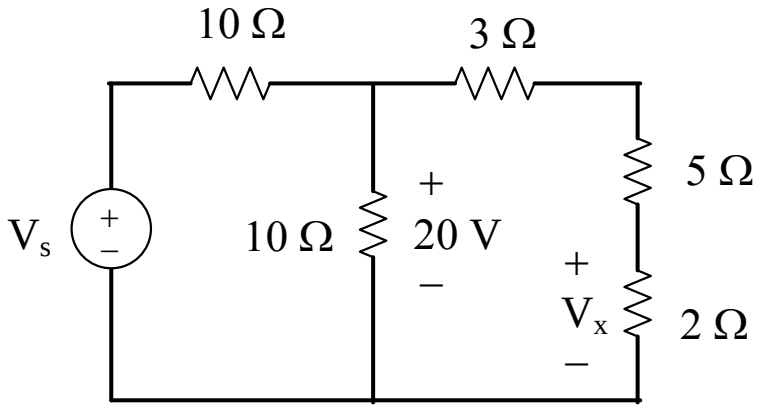



For the circuit shown above, the power deliver by the independent voltage source is

(*i*) 6 W (*ii*) $-6$ W (*iii*) 12 W (*iv*) $-12$ W

(*v*) 18 W (*vi*) $-18$ W **(*vii*) 24 W** (*viii*) $-24$ W

**(g)**

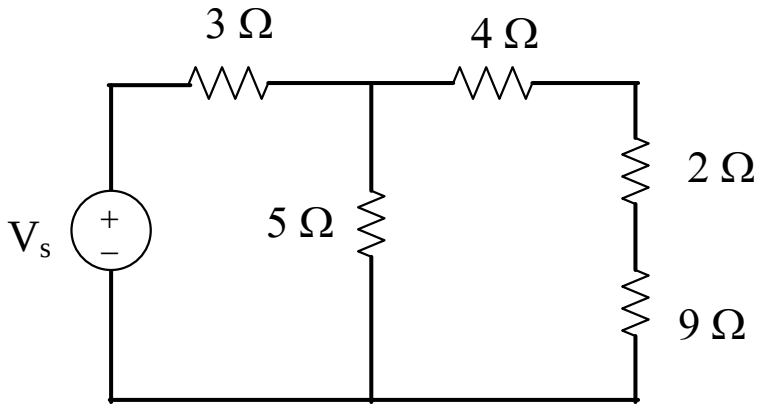



For the circuit shown above, the voltage $V_x$ is

(*i*) 4 V (*ii*) −4 V (*iii*) 2 V (*iv*) −2 V

(*v*) 10 V (*vi*) −10 V (*vii*) 5 V (*viii*) −5 V

**(h)**

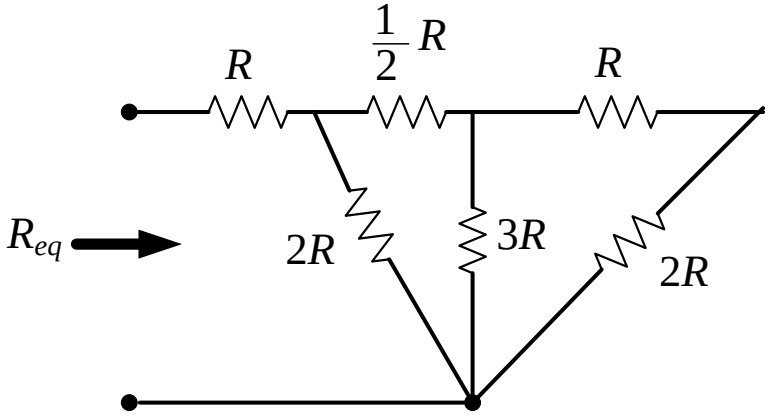



For the circuit shown above, if the 3 Ω absorbs 1200 W , then the 9 Ω absorbs

(*i*) 625 W (*ii*) 150 W (*iii*) 75 W (*iv*) 225 W

(*v*) 900 W (*vi*) 750 W (*vii*) 100 W (*viii*) 350 W

**(k)**

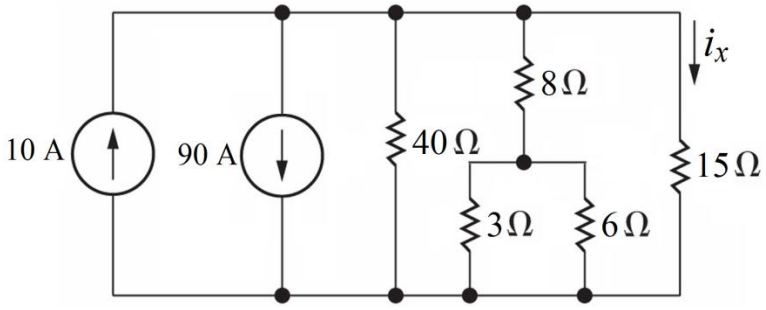



For the circuit shown above, the equivalent resistant $R_{\text{eq}}$ is

(*i*) $R$ **(*ii*) $2R$** (*iii*) $3R$ (*iv*) $0.5R$

(*v*) $1.5R$ (*vi*) $2.5R$ (*vii*) $4R$ (*viii*) $3.5R$

**(l)**

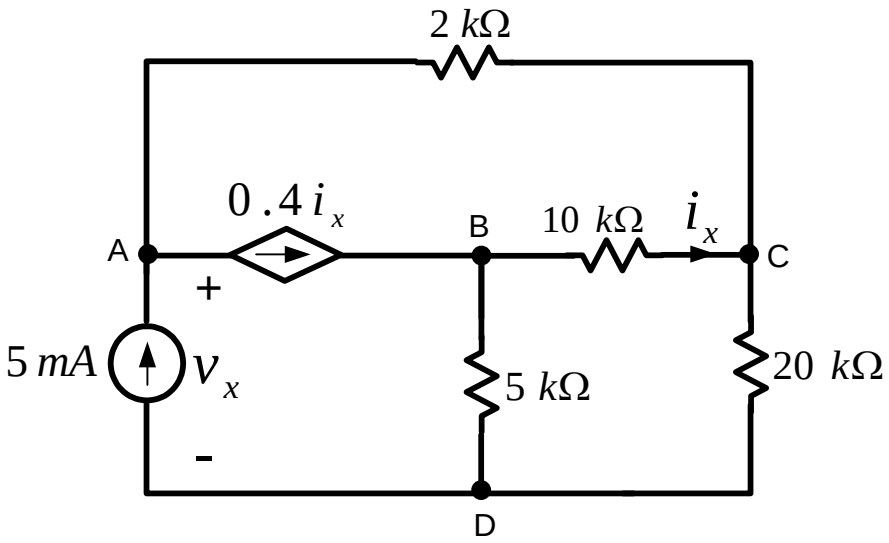



For the circuit shown above, the current $i_{\text{x}}$

i) 16.67 A, ii) −16.67 A, iii) 18.46 A, iv) −18.46 A,

v) 27.83 A, **vi) −27.83 A,** vii) 35.44 A, viii) −35.44 A.

**Problem No 2 (30)**




For the circuit shown above Using KCL and KVL and ohm's law ,find $i_x$ and $v_x$ ?

**( Do Not Use Node Voltage Method or Mesh Method )**

Taking KCL at A

$$i_{2k\Omega} = 5 - 0.4i_x$$

Taking KCL at B

$$i_{5k\Omega} = 0.6i_x$$

Taking KCL at C

$$i_{20k\Omega} = i_x + i_{2k\Omega} = 5 + 0.6i_x$$

Taking KVL for the path "BCDB"

$$10i_x + 20(5 + 0.6i_x) + 5 \times 0.6i_x = 0$$

$$25i_x = -100$$

$$i_x = -4\ mA$$

Taking KVL for the path "ACBA"

$$2(5 - 0.4i_x) - 10i_x = v_{AB}$$

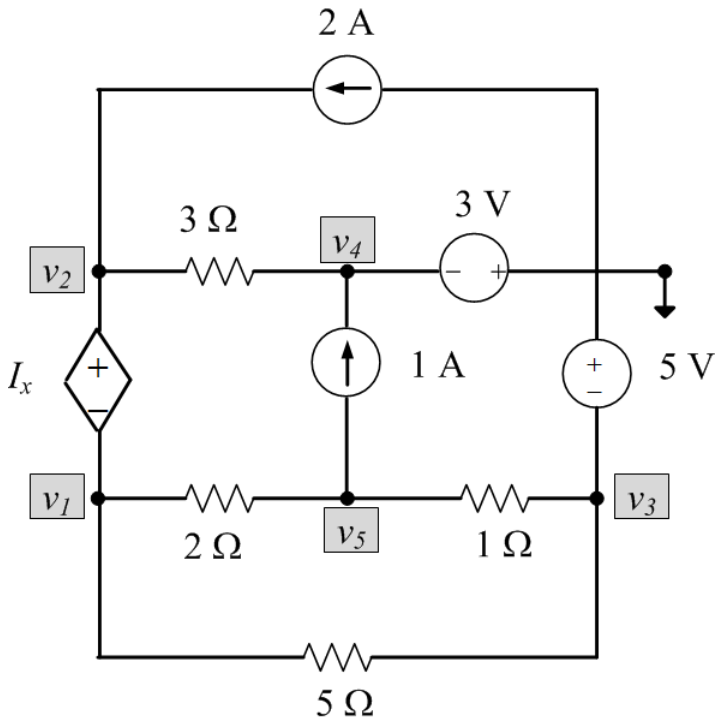
$$v_{AB} = 53.2\ V$$

Taking KVL for the path "ABDA"

$$v_{AB} - 5 \times 0.6i_x = v_x$$

$$v_x = 65.2\ V$$

**Problem No 3 (20)**




For the circuit shown above find the nodal equations necessary to solve for the node voltages $v_1, v_2, v_3$ **DO NOT SOLVE ANY SYSTEM OF EQUATIONS**

$v_4 = -3\text{ V} \quad v_5 = -5\text{ V}$

KCL SN $\Rightarrow \dfrac{v_2+3}{3} + \dfrac{v_1-v_3}{2} + \dfrac{v_1+5}{5} - 2 = 0$

$\Rightarrow 21v_1 + 10v_2 - 15v_3 = 0$ ------- (1)

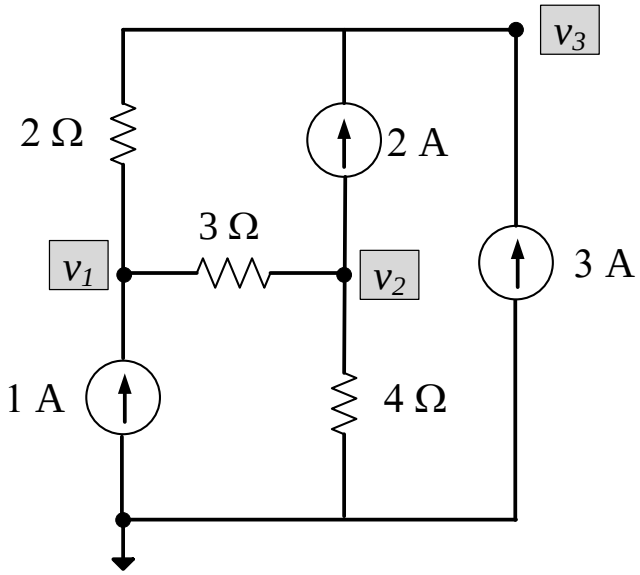
KCL at v3 $\Rightarrow \dfrac{v_3-v_1}{2} + \dfrac{v_3+5}{4} + 1 = 0$

$\Rightarrow -2v_1 + 3v_3 = -9$ ------- (2)

Voltage Restrection $v_2 - v_1 = I_x = \dfrac{v_2+3}{3}$

$\Rightarrow \quad -3v_1 + 2v_2 = 3$ ------- (3)

**Problem No 4 (10)**




For the circuit shown above if the nod voltages are given as :

$v_1 = 34$ V $\qquad v_2 = 16\ V \qquad v_3 = 44\ V$

Find the power delivered by the independent current sources ?

$$P_{1A}^{delivered} = v_1(1)=34(1)=34 \text{ W}$$

$$P_{2A}^{delivered} = (v_3 - v_2)(2)=(44-16)(2) = 56 \text{ W}$$

$$P_{3A}^{delivered} = v_3(3)=44(3)=132 \text{ W}$$