Semester II (B.Tech)

Er. No.....

Academic Year: 2021-22

# Jaypee University of Engineering & Technology, Guna

## T-1 (Even Semester 2022)

18B11EC211 - ELECTRICAL SCIENCE

Maximum Duration: 1 Hour

Maximum Marks: 15

Notes:

1. This question paper has ***five*** questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except your Er. No.).

**Marks**

**Q1.** What do you mean by active elements? Explain various types of dependent/controlled energy sources with the help of suitable example. **[03]**

**Q2.** Reduce the electrical circuit shown in Fig. 1 across *a-b* into a single practical voltage source circuit using source transformation and then determine voltage $v_x$ using voltage divider rule. **[03]**

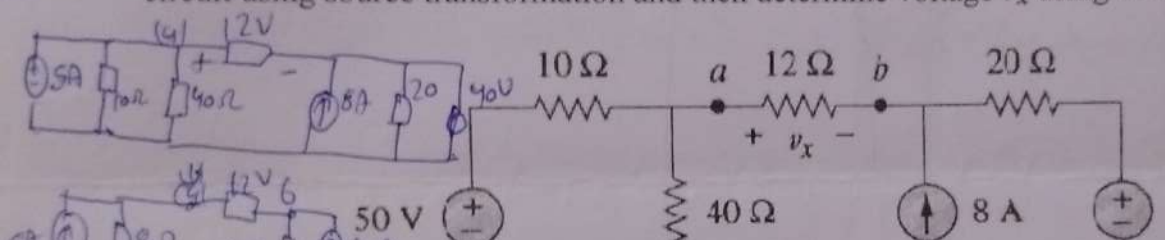



Fig. 1

**Q3.** Find the equivalent resistance at terminals *a-b* of the circuit shown in Fig. 2. **[03]**

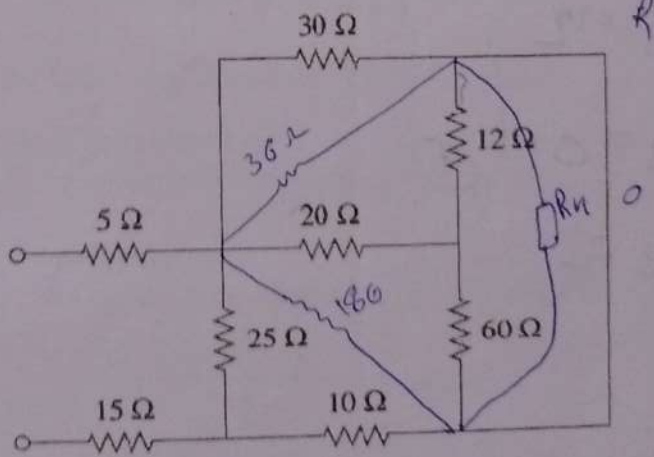



Fig. 2

**Q4.** State the Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL). Determine unknown voltages $v_1$, $v_2$, $v_3$ in the circuit shown in Fig. 3 using KVL. **[03]**

By KVL

$24 - V_1 - 10 = 0$

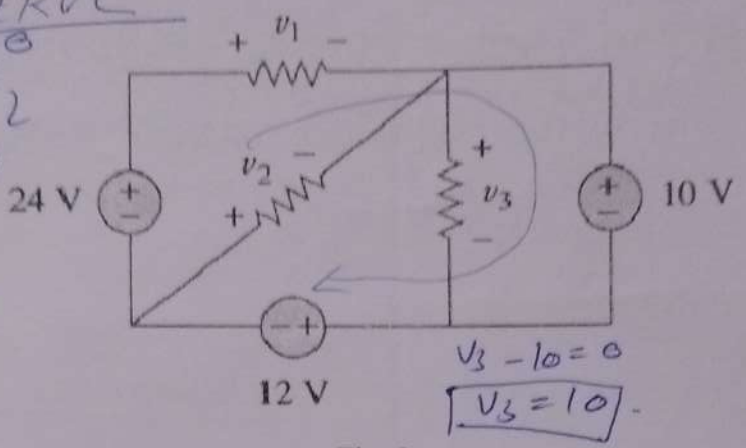
$V_1 = 14 - 12 = 2$

$V_1 = 2$

~~$24 - 14 + V_2 = 0$~~

$24 - 2 + V_2 = 0$

$V_2 = -22$




$V_3 - 10 = 0$

$V_3 = 10$

Fig. 3

**Q5.** Use mesh analysis to calculate $v_0$ in the circuit shown in Fig. 4. **[03]**

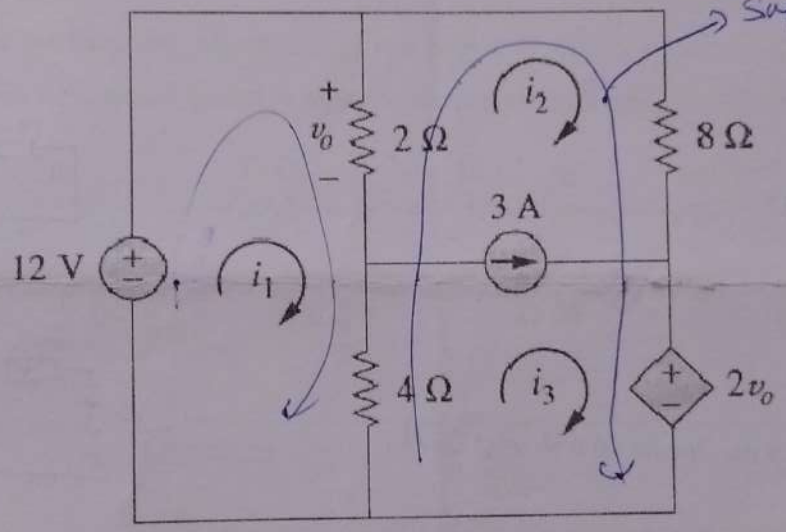



Fig. 4

$6i_1 - 2i_2 - 4i_3 = 12$

$-2i_1 + 6i_2 + 4i_3 = 0$

$0 \cdot i_1 + -i_2 + i_3 = 3$

$i_1 = 3.5$

$i_2 = -0.5A$

$i_3 = 2.5A$



$I_1$ 1.93

$I_2$ .56