

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– III EXAMINATION – SUMMER 2026****Subject Code:3132406****Date:19-06-2026****Subject Name:Circuit Theory****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define followings:- **03**
 (i) Loop (ii) Electric work (iii) Potential difference
- (b) Simplify the N/W Given in Fig.1, using Source Transformation for both the Voltage Sources and find Current i_{10} . **04**
- (c) Explain Maximum Power Transfer Theorem with the help of Circuit Network. Derive the equation of Maximum Power for AC Circuits. Also give the condition for Maximum Power transfer. **07**
- Q.2** (a) Compare Node Voltage Analysis with Loop Variable Analysis. **03**
 (b) Explain Star-Delta Connection and Delta-Star Connection. **04**
 (c) List the steps for analysis of network using Laplace Transformation Method **07**
- OR**
- Q.3** (c) Summarize Significance of Pole-Zero location in S-plane. **07**
 (a) Discuss Interconnections of Two Port Networks. **03**
 (b) Apply Nodal Analysis for the Network shown in Fig.2 and find Current across 2Ω Resistor Connected between Two Nodes. **04**
 (c) State properties of Laplace Transform and prove any one of them. **07**
- OR**
- Q.3** (a) Explain in brief Hybrid Parameters. **03**
 (b) State and Explain Superposition Theorem with Suitable Example. **04**
 (c) As shown in Fig.3 a Series RLC Circuit having Zero Inductor Current and Zero Capacitor Voltage is excited by 20V DC Source. Assume values of $R=10\Omega$, $L=2H$ and $C=10\mu F$ and a switch "K" is connected in Series with RLC. Find out $i(0+)$, $di/dt(0+)$. **07**
- Q.4** (a) What is an Impulse Function? Find the Impulse Response $h(t)$ for the Network Function $H(s) = \frac{1}{s^2 + 4s + 4}$ **03**
 (b) Write a technical note on: - Steady and Transient Response. **04**
 (c) Obtain the value of Thevenin's Equivalent Voltage and Thevenin's Equivalent Resistance for the Network Shown in the Fig.4. **07**
- OR**
- Q.4** (a) Why Study Initial Condition? Enlist the Advantages Which results from understanding of Initial Condition. **03**
 (b) Find out the Y-Parameters of the Network Shown in the Fig.5. **04**
 (c) The Network Shown in Fig.6 is in the steady state with the Switch K closed. At $t=0$, the Switch is opened. Determine the

Voltage across the Switch v_k and dv_k/dt at $t=0_+$.

- Q.5 (a) What do you understand by Circuit? Differentiate Average Power and Complex Power. 03
- (b) Explain in brief Dot Convention in Coupled Circuits. 04
- (c) Find the Current Passing through 3Ω Resistor in the Fig.7 Using Nodal Analysis. 07

OR

- Q.5 (a) Explain in brief Inverse Laplace Transform 03
- (b) Define Power Triangle. Explain Rectangular, Polar, Exponential forms of Phasor Representation. 04
- (c) Find out the Z-Parameters of the Two Port Network Shown in the Fig. 8. 07

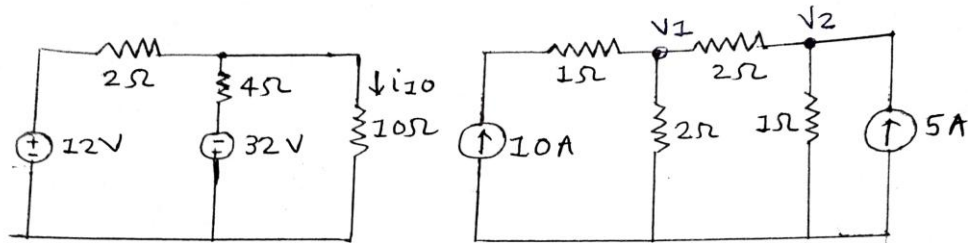


Fig. ①

Fig. ②

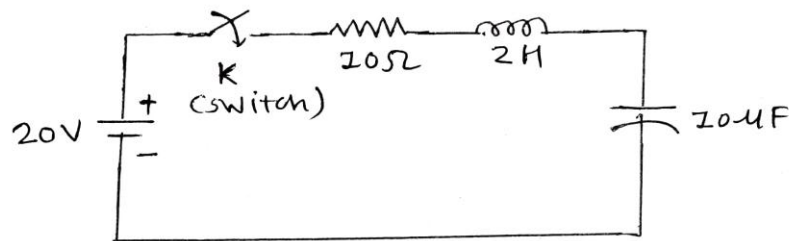
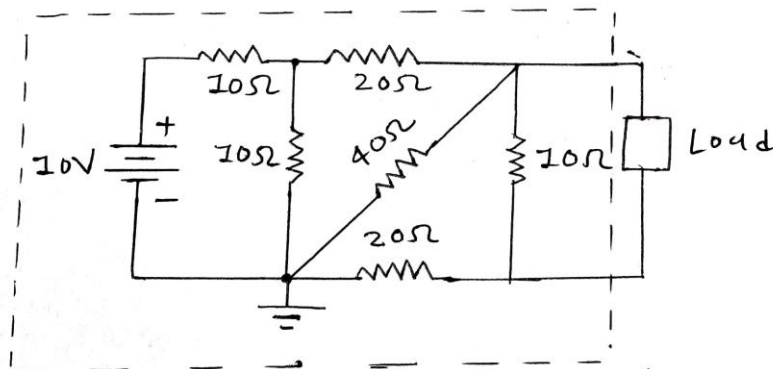


Fig. ③



Value of all resistors are in ohms.

Fig. ④

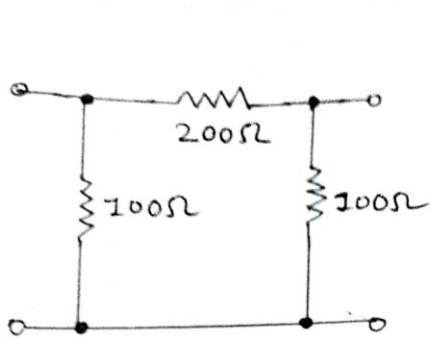


Fig. ⑤

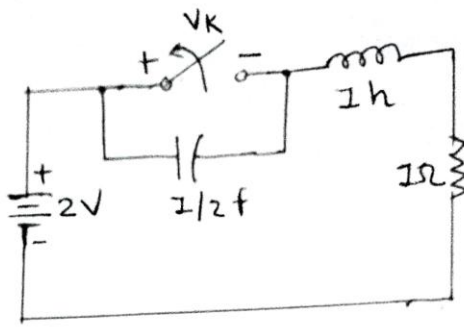


Fig. ⑥

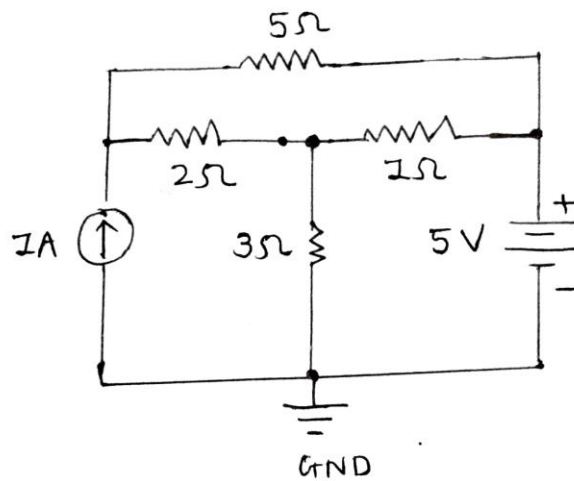


Fig. ⑦

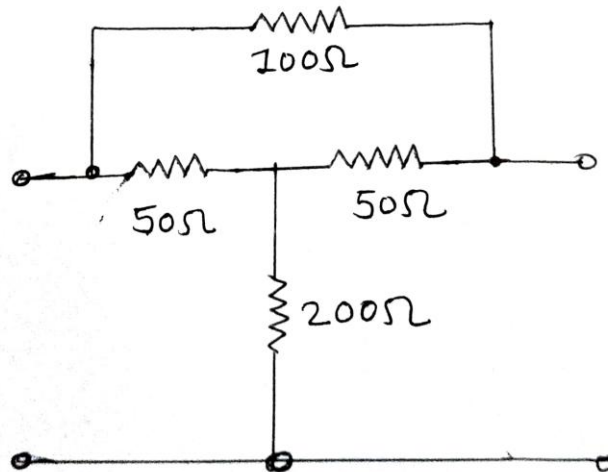


Fig. ⑧