

GUJARAT TECHNOLOGICAL UNIVERSITY

DI -1 SEMESTER – OLD PAPER – W24 TO S25 – QUESTION BANK(English)

Subject Name & Code:

D.C Circuits- DI01000081

Unit 1: Fundamentals of Electrical Circuits

Repeated Questions:

1. **Define Resistance, Current and Conductance.**
 - Appeared in: W24 (Q1a, 03 marks)
2. **Explain Ohm's law and state its limitations.**
 - Appeared in: W24 (Q2a-OR, 03 marks), S25 (Q1b, 04 marks)
3. **State and explain the factor affecting the resistance of material in detail.**
 - Appeared in: W24 (Q2a, 03 marks), S25 (Q1c, 07 marks)
4. **Define Work, Power and Energy.**
 - Appeared in: S25 (Q1a, 03 marks)
5. **6 Lamps each of 40W operated daily for 4 hours, two tube lights each of 125 W are operated daily for 3 hours and One 1000W heater is operated daily for 2 hours. Find the cost of energy consumed at Rs.4.00 per unit for the month of December.**
 - Appeared in: W24 (Q1c, 07 marks)
6. **Derive the equation $R = R_0[1 + \alpha_0(t - t_1)]$ / Prove that $R_2 = R_1[1 + \alpha_0(t_2 - t_1)]$.**
 - Appeared in: W24 (Q1c-OR, 07 marks), S25 (Q1c-OR, 07 marks)

Other Important Questions:

1. **Explain effect of temperature on Resistance of conductor and semiconductor.**
 - Appeared in: S25 (Q2a-OR, 03 marks)
2. **Explain Open circuit, short circuit and closed circuit.**
 - Appeared in: S25 (Q2a, 03 marks)

Unit 2: Electrical Circuit Laws and Techniques

Repeated Questions:

1. **Explain Kirchhoff's current and voltage law in detail with circuit diagram. / State and explain Kirchhoff's first and second law in detail with circuit diagram.**
 - Appeared in: W24 (Q2c, 07 marks), S25 (Q2c, 07 marks)
2. **Derive equation for Delta to Star transformation of resistance. / Explain Delta-Star Transformation with circuit diagram.**
 - Appeared in: W24 (Q2b, 04 marks), S25 (Q2c-OR, 07 marks)
3. **Compare series and parallel connection of resistor.**
 - Appeared in: W24 (Q2c, 07 marks)
4. **Three resistances of $20\ \Omega$, $30\ \Omega$ and $50\ \Omega$ are connected in star. Find their equivalent delta connected resistance. / Three resistors $40\ \Omega$, $60\ \Omega$, and $80\ \Omega$ are connected in delta, find its equivalent star resistance.**
 - Appeared in: W24 (Q2b-OR, 04 marks), S25 (Q3b-OR, 04 marks)

Other Important Questions:

1. **Explain principle of Duality.**
 - Appeared in: S25 (Q2b, 04 marks)
2. **Three resistances of $10\ \Omega$, $25\ \Omega$ and $50\ \Omega$ are connected in parallel and supplied with a voltage of $50\ \text{V}$, then find 1) Total current 2) Equivalent resistance.**
 - Appeared in: S25 (Q2b-OR, 04 marks)
3. **Discuss connection of resistors in series.**
 - Appeared in: S25 (Q3a, 03 marks)

Unit 3: Electrical Network Theorems

Repeated Questions:

1. **Explain Maximum Power transfer theorem.**
 - Appeared in: W24 (Q1b, 04 marks), S25 (Q3b, 04 marks)
2. **State and explain Superposition Theorem with example in detail.**
 - Appeared in: S25 (Q3c-OR, 07 marks)
3. **Explain the steps for finding current flowing through an element of a network using Thevenin's theorem.**
 - Appeared in: S25 (Q3c, 07 marks)

Other Important Questions:

1. **Using Superposition theorem, Calculate current flowing through $6\ \Omega$ resistance shown in figure 1.**
 - Appeared in: W24 (Q4b, 04 marks)
2. **Using Thevenin theorem, Calculate current flowing through $4\ \Omega$ resistance shown in figure 2.**
 - Appeared in: W24 (Q4b-OR, 04 marks)
3. **Explain the ideal and practical voltage source with characteristics.**
 - Appeared in: S25 (Q3a-OR, 03 marks)
4. **Define Linear Network, Bilateral Network, Node, Loop.**
 - Appeared in: W24 (Q3b, 04 marks)
5. **Define Electric Network, Active Element, Unilateral Network, Mesh.**
 - Appeared in: W24 (Q3b-OR, 04 marks)

Unit 4: Electrostatics and Capacitors

Repeated Questions:

1. **Derive the equation for charging of capacitor.**
 - Appeared in: W24 (Q3c, 07 marks), S25 (Q5c, 07 marks)
2. **Derive the equation for the energy stored in capacitor.**
 - Appeared in: W24 (Q3c-OR, 07 marks), S25 (Q5c-OR, 07 marks)
3. **Explain Capacitors in Parallel Connection.**
 - Appeared in: W24 (Q4a, 03 marks)
4. **Explain Capacitors in Series Connection.**
 - Appeared in: W24 (Q4a-OR, 03 marks), S25 (Q5b, 04 marks)

Other Important Questions:

1. **List out the various application of Capacitors. / State types of Capacitors. / State and classify types of capacitors.**
 - Appeared in: W24 (Q3a, 03 marks), W24 (Q3a-OR, 03 marks), S25 (Q5a, 03 marks)
2. **State and explain Coulomb's law of electrostatics.**
 - Appeared in: S25 (Q5a-OR, 03 marks)

Unit 5: Magnetic circuit and Electromagnetic Induction

Repeated Questions:

1. **Compare Magnetic circuit and Electric circuit.**
 - Appeared in: W24 (Q4c, 07 marks), S25 (Q4b, 04 marks)
2. **State Faraday's and Lenz Law. / State and explain Faraday's law of Electromagnetic Induction.**
 - Appeared in: W24 (Q5b, 04 marks), S25 (Q4a, 03 marks)
3. **Derive formula for energy stored in magnetic field. / Derive the Equation for Energy stored in magnetic field.**
 - Appeared in: W24 (Q5c, 07 marks), S25 (Q4b-OR, 04 marks)
4. **Explain Dynamically and Statically Induced EMF. / Give comparison between dynamically and statically induced emf.**
 - Appeared in: W24 (Q4c-OR, 07 marks), S25 (Q5b-OR, 04 marks)
5. **Derive equation $K = M / (L_1 L_2)^{1/2}$ / Derive equation for co-efficient of coupling $K = M / \sqrt{L_1 L_2}$ between two coils.**
 - Appeared in: W24 (Q5c-OR, 07 marks), S25 (Q4c-OR, 07 marks)

Other Important Questions:

1. **Define MMF, Permeability and Reluctance.**
 - Appeared in: W24 (Q5a, 03 marks)
2. **List out the various application of Inductor.**
 - Appeared in: W24 (Q5a-OR, 03 marks)
3. **Define Flux Density, Permeance, Magnetic Field intensity and Magnetic flux.**
 - Appeared in: W24 (Q5b-OR, 04 marks)
4. **Define: Magneto motive force, Magnetic Flux and Magnetic Flux Density.**
 - Appeared in: S25 (Q4a-OR, 03 marks)
5. **Obtain the equation of equivalent inductance $L = L_1 + L_2 - 2M$ when two inductors are connected in series oppositions.**
 - Appeared in: S25 (Q4c, 07 marks)
