Reg. No. | | | | | | | | | | | | |

Question Paper Code : X10349

B.E./B.Tech. DEGREE EXAMINATIONS NOV/DEC 2020 AND APRIL / MAY 2021

Second Semester

Electronics and Communication Engineering

EC8251 - CIRCUIT ANALYSIS

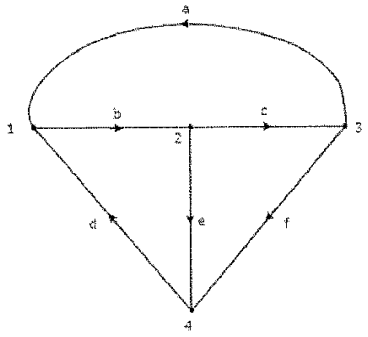
(Common to: Biomedical Engineering / Electronics and Telecommunication Engineering / Medical Electronics)

(Regulations 2017)

Time: 3 Hours Answer ALL Questions Max. Marks 100

PART- A (10 x 2 = 20 Marks)

1. Three resistors of values 2Ω, 3Ω, and 5Ω are connected in series across a 20 V DC Supply. Find the current that passes through the circuit.
2. Find the Incidence matrix of the following directed graph.

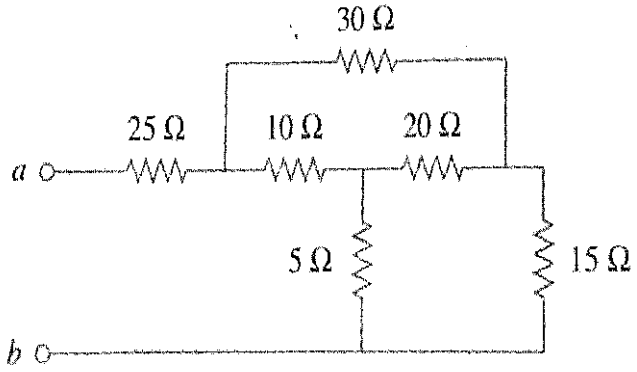


3. Why is Superposition Theorem not applicable to directly calculate the power in linear circuits?
4. State the maximum power Transfer Theorem.
5. Define Q Factor of a Circuit. Also, give its significance.
6. Write the equations for Resonant Frequency of Series RLC and Parallel RLC Circuits.
7. Find the amplitude, phase, time period and frequency of the sinusoid signal

   $v(t) = 12\cos(50t + 10^0)$
8. In an electric circuit, the voltage across a capacitor does not change abruptly. Is this true? Justify your answer.
9. Write the Open-Circuit Impedance Parameters of a Two-Port Network.
10. Brief the term “Reciprocal Network”

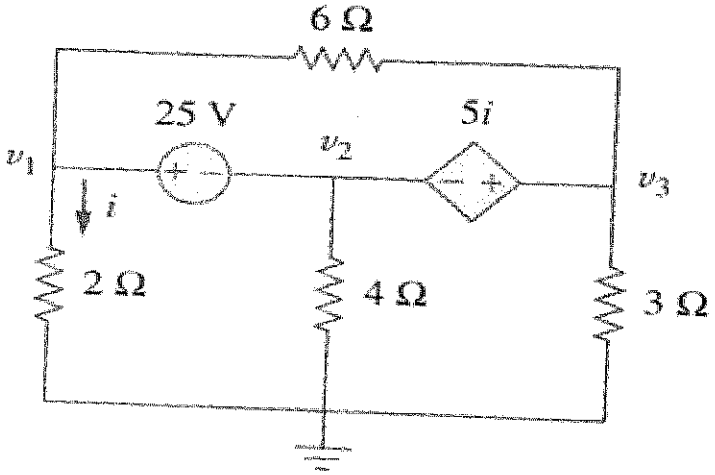
PART- B (5 x 13 = 65 Marks)

11. a) Find the equivalent resistance across the terminals 'a' and 'b' of the following electrical network. **(13)**

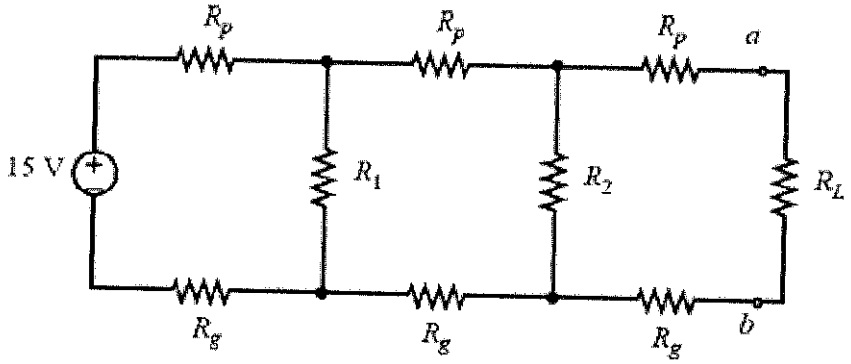


OR

b) Using Nodal Analysis, determine v_1, v_2, and v_3 in the circuit given below **(13)**

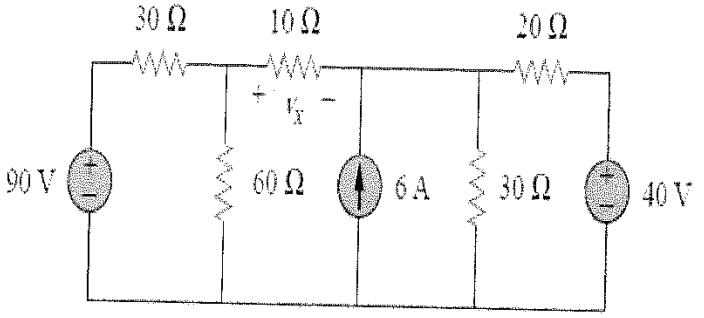


12. a) Using Thevenin's Theorem, find the current flowing through the load resistor R_L in circuit shown below, when $R_1 = 10\Omega$, $R_2 = 20\Omega$, $R_g = 0.1\Omega$, $R_p = 1\Omega$, and $R_L = 5\Omega$. **(13)**



OR

b) State the Superposition Theorem and find the value of v_x in the given circuit using the same. **(13)**



13. a) Derive the expression for resonant frequency in RLC Series Circuits. **(13)**

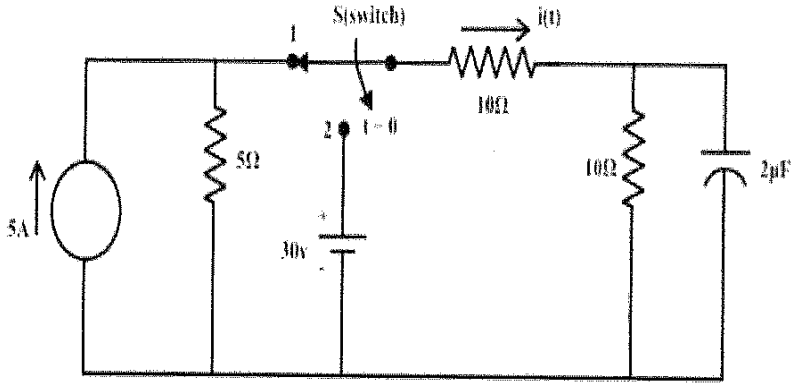
OR

b) Discuss in detail about Single-tuned and Double-tuned Coupled Circuits. **(13)**

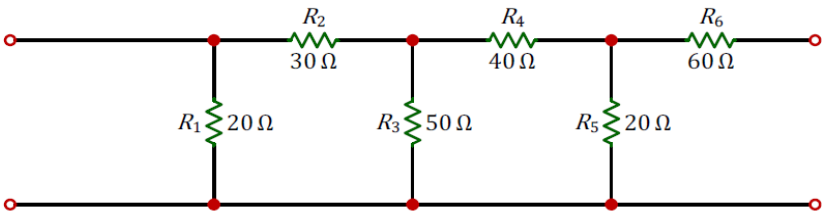
14. a) Elucidate the complete response of series RLC circuit with sinusoidal excitation. **(13)**

OR

b) For the circuit shown below, Switch 'S' is kept at the position '1' for a long time and then it is brought to position '2' at time, t=0. Find the current expression i(t) for t≥0 and also calculate the time constants of the circuit before and after the switching phases. **(13)**

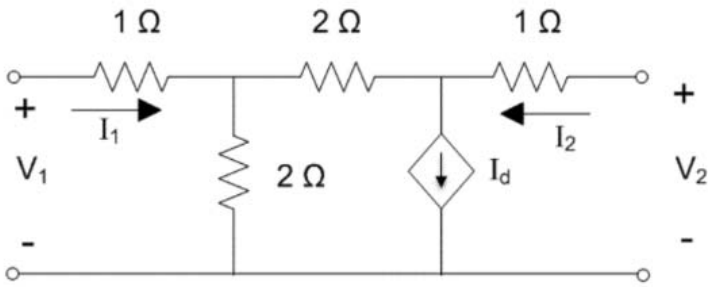


15. a) Obtain the ABCD Parameters of the following two-port network **(13)**



OR

b) Find the H Parameters of the following two-port network **(13)**



PART- C (1 x 15 = 15 Marks)

16. a) Two coils connected in series have an equivalent inductance of 10H. When the connections of one coil are reversed, the effective inductance is 6H. If the co-efficient of coupling is 0.6, calculate the self-inductance of each coil and mutual inductance. **(15)**

OR

b) Draw the Norton's equivalent circuit across the points A and B for the circuit shown below and calculate the power dissipated across the 5 Ω load resistor. Verify whether the load resistor dissipates maximum power, if not suggest a suitable load resistor to dissipate the maximum power across the load **(15)**