www.binils.com
Anna University | Polytechnic | Schools

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

Question Paper Code : 40481

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Second Semester

Electrical and Electronics Engineering

EE 8251 – CIRCUIT THEORY

(Common to : Electronics and Instrumentation Engineering/
Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the formula for find the equivalent resistance offered by 'N' number of arbitrary valued resistors connected in series.

www.binils.com

2. A network has a 5V voltage source and two resistors in series. If the source supplies 1A current and a resistor has a value of 2Ω then, find the resistance of other resistor.

3. Write source transformation theorem.

4. Let a network offers Thevenin's equivalent voltage of 5V and Norton's equivalent current of 1 mA. Find the Thevenin's resistance of the network.

5. What is the meaning of time constant?

6. A series RC network is energized by a DC source. Find the voltage across the resistor 'R' at steady state.

7. Draw the phasor diagram of ideal three phase voltage supply.

8. If a load produces 30° phase shift between voltage and current while it is energized by a source then, calculate the power factor.

9. Write the condition for a circuit at resonant to a load.

10. If two inductors of 1mH each have coupling coefficient unity. Find the mutual inductance between the inductors.

www.binils.com
Anna University, Polytechnic & Schools

www.binils.com
Anna University | Polytechnic | Schools

PART B — (5 × 13 = 65 marks)

11. (a) Apply nodal analysis to find the voltages at all non-reference nodes in the circuit shown in Figure Q.11 (a).

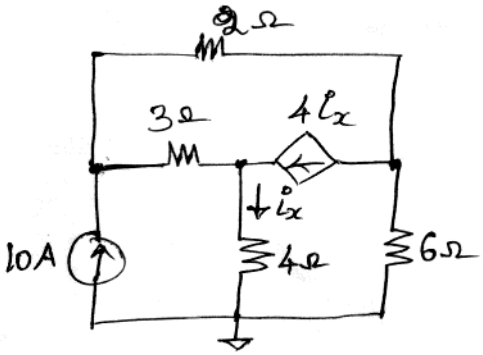
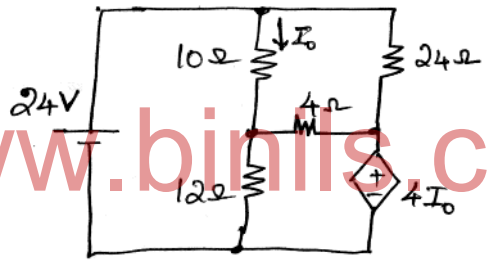


Figure Q.11 (a)

Or

(b) Apply mesh analysis to find the current lo in the circuit shown in Figure Q.11 (b).



www.binils.com

Figure Q.11 (b).

12. (a) Apply superposition theorem to find current '*i*' m the circuit shown in Figure Q.12 (a).

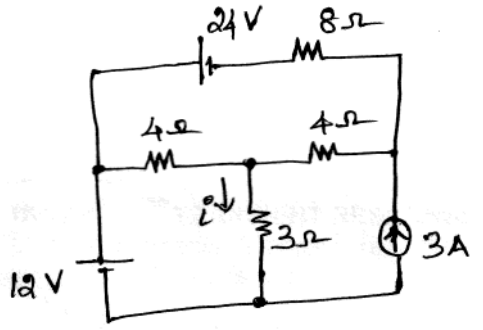


Figure Q.12 (a).

Or

www.binils.com
Anna University, Polytechnic & Schools

www.binils.com
Anna University | Polytechnic | Schools

(b) Find the value of R_L for maximum power transfer in the circuit shown in Figure Q.12 (b) and find the maximum power.

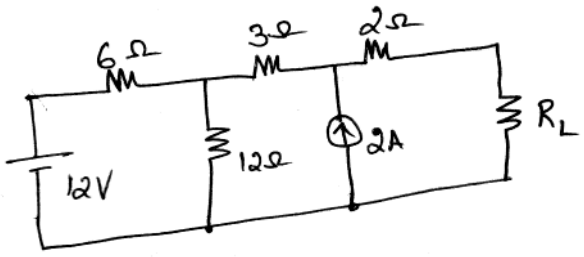


Figure Q.12 (b)

13. (a) In the circuit shown in Figure Q.13 (a), the switched is closed for long time and opened at t = 0. Find values of '*i*' abd 'V' for all time.

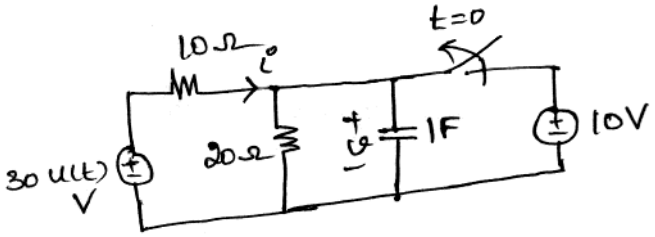


Figure Q.13 (a)

Or

www.binils.com

(b) Find Norton's equivalent network and obtain the current 10 in the circuit shown in Figure Q.13 (b).

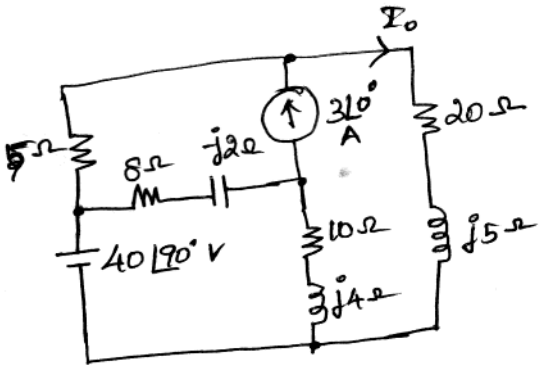


Figure Q.13 (b)

14. (a) Draw the phasor diagram of three phase voltages and discuss the power measurement methods in three phase circuits.

Or

www.binils.com
Anna University, Polytechnic & Schools

www.binils.com
Anna University | Polytechnic | Schools

(b) Consider a reactive load has voltage $v(t) = V_m \cos(\omega t)$ and current $i(t) = l_m \cos(\omega t + \theta)$. Draw the phasor diagram for voltage and current and also discuss on instraneous power, complex power, average power, reactive power and power factor with the voltage and current considered.

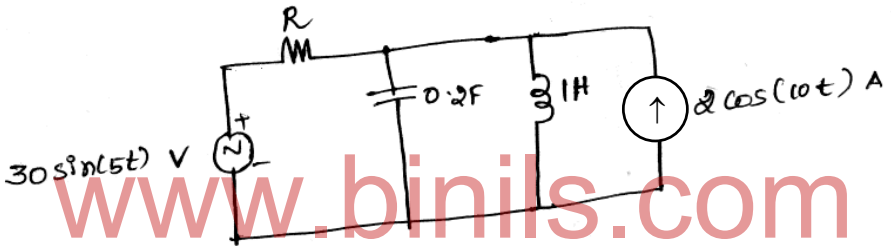
15. (a) Derive the formula for resonant frequency, bandwidth and quality factor for series RLC circuit.

Or

(b) Derive the formula for resonant frequency, bandwidth and quality factor for parallel RLC circuit.

PART C — (1 × 15 = 15 marks)

16. (a) Consider a circuit shown in Figure Q.16 (a) which is energized by two sources with different frequencies. Find the voltage across the capacitor while resistance R equals 8Ω.



www.binils.com

Figure Q.16 (a)

Or

(b) Consider a circuit shown in Figure Q.16 (b) which is energized by two sources with different frequencies. State whether it is possible to have single value for R that can derive maximum power from sources and find the values of impedance needed to replace the resistor R to derive maximum power from each source.

———————

www.binils.com
Anna University, Polytechnic & Schools