Hall Ticket Number:

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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (EEE: CBCS) III-Semester Supplementary Examinations, May/June-2018

Electrical Circuits-I

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** questions from **Part-B***

Part-A (10 × 2=20 Marks)

1. Determine R_{AB} for the circuit shown in the fig 1.

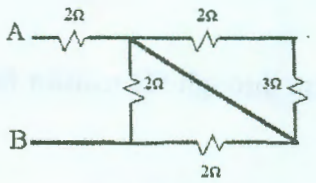


fig 1.

2. Determine 'i' for the circuit shown in the fig 2.

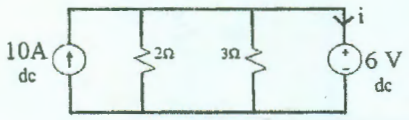


fig 2.

3. Derive RMS value of a full wave rectifier output clipped at half of its maximum value.
4. A 220 W, 110V lamp is to be connected across a 230 V, 50 Hz ac supply by connecting a capacitor in series so that the voltage across the lamp is 110V. What should be the value of the capacitor?
5. State and explain Reciprocity theorem.
6. Explain the procedure to obtain Thevenin's equivalent for the circuits containing dependent sources.
7. What are half power frequencies?
8. Draw the graph of X_L vs. frequency with respect to a series RLC circuit.
9. Prove that the power in a 3Φ system is $\sqrt{3}V_L I_L cos\emptyset$ irrespective of star or delta.
10. Distinguish between self & mutual inductances.

Part-B (5 × 10 = 50 Marks)

11. a) Prove that power in Electrical Systems is given by the product of voltage and current [4]

    b) Determine effective resistance between nodes A & B in circuit as shown in fig.3 [6]

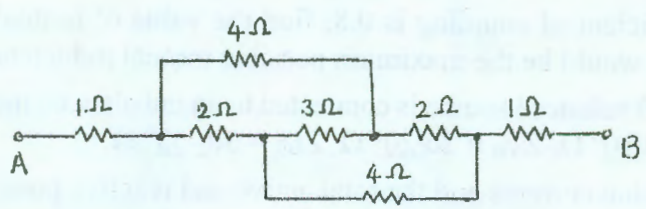


fig 3.

Contd...2

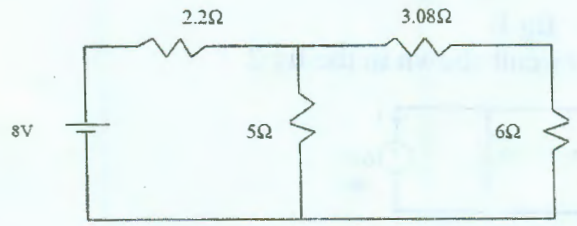
12. a) Explain the concept of phase and phase difference using suitable example. [4]

b) A parallel circuit having two branches, first branch consisting of 3Ω resistor in series with 12.7mH inductor and second branch consists of 1Ω resistor in series with 3.18mH inductor. The whole combination is connected to a 200V, 1Φ, 50Hz supply. Calculate [6]

1) Conductance & susceptance of each branch
2) The equivalent admittance
3) The current in each branch
4) The total current.

13. a) State and explain Millman's theorem. [5]

b) Applying Thevenin's theorem, determine the current through 5Ω resistor for the circuit shown in Fig.4. [5]



14. a) A series RLC circuit is connected to a variable frequency supply. State what happens when [2]

a) $f < f_r$
b) $f = f_r$
c) $f > f_r$

b) A coil has a resistance of 400Ω and inductance of 318μH. Find the capacitance of the capacitor which when connected in parallel with the coil will produce resonance with a supply frequency of 1MHz. If a second capacitor of 23.5pF is connected in parallel with the first capacitor, find the frequency at which resonance will occur. [8]

15. a) What is "Dot Convention". Explain with the help of an example. [5]

b) A 3Φ, 3 wire, 400V, RYB system supplies a delta connection of three equal impedances of 5 /45° Ohms. Determine the line currents I_R, I_Y & I_B and draw the phasor diagram [5]

16. a) Write a note on Source transformation. [4]

b) A coil takes a current of 1A at 0.6 lagging power factor from a 220V, 60Hz, single phase, 60Hz supply. If the coil is modelled by a series RL circuit find [6]

i. Complex power in the coil
ii. Values of R & L.

17. Answer any ***two*** of the following:

a) Explain Maximum Power Transfer theorem with respect to DC circuits. [5]

b) Two magnetically coupled coils have self-inductance L_1=100mH and L_2=400mH.

If the coefficient of coupling is 0.8, find the value of mutual inductance between the coils. What would be the maximum possible mutual inductance? [5]

c) A 400V, 3-Ø balanced source is connected to an unbalanced mesh connected impedances of $Z_{RY} = 10/10^\circ\ \Omega$; $Z_{YB} = 20/20^\circ\ \Omega$; $Z_{BR} = 30/-53^\circ\ \Omega$. [5]

Determine line currents and the total active and reactive power.

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