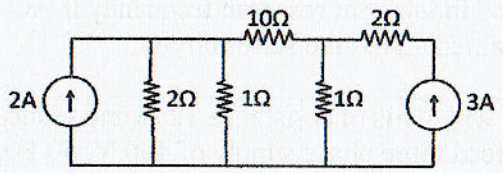
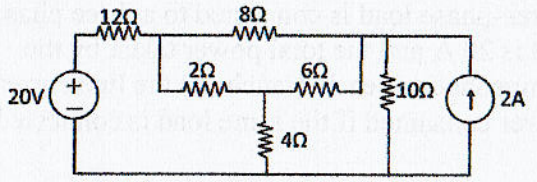
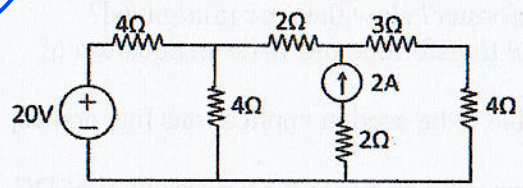
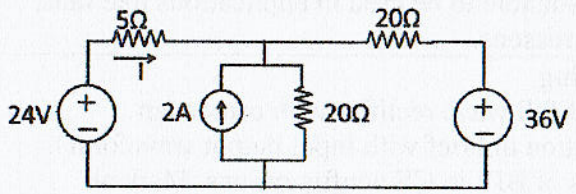
21-12-2019 (M)

**K. J. Somaiya College of Engineering, Mumbai-77**
**(Autonomous College Affiliated to University of Mumbai)**
**End Semester Exam**
Nov – Dec. 2019

**Max. Marks:100** **Duration: 3hrs**
Class: F. Y. B.Tech Semester: I & II
Name of the Course: Elements of Electrical and Electronics Engineering
Branch: All
Course Code: 2UHC107 (KJSCE-2018)

**Instructions: (1) All Questions are Compulsory (2) Draw neat diagrams (3)Assume suitable data if necessary (4) Each sub-question carries equal marks**

| Question No. | | Max. Marks |
|---|---|---|
| Q1 | **Solve any three of the following**<br>(a) Find the power loss in 10 Ω resistor using Thevenin's theorem. Calculate maximum power transfer possible through 10 Ω.<br>  <br>(b) Find voltage across 4 Ω resistor. Use circuit simplification methods such as source transformation and star-delta transformation only.<br>  <br>(c) Determine current through 3 Ω resistor using Norton's theorem.<br>  <br>(d) Find current I in the following circuit using superposition theorem.<br>  | 30 |
| Q2 | **Solve any three of the following**<br>(a) A resistor and a coil of negligible resistance are connected in series across a 230V, 50Hz supply. The current through the coil is 15 A and lags behind the voltage by 35°. If a pure capacitor is connected in series with above resistor and coil, the current lags voltage by 25°. Find the value of (i) resistor (ii) inductor (iii) capacitor. | 30 |

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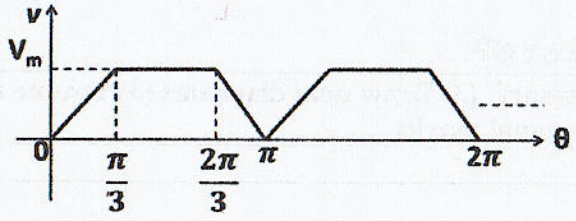
|---|---|---|
| | (b) A coil of resistance 90 Ω and inductance 0.5 H is connected in parallel with a 20 μF capacitor across 230V, 50Hz supply. Find (i) total current drawn from the supply (ii) power factor of the parallel circuit (iii) total power taken from the source (iv) Draw the phasor diagram.<br><br>(c) Find the average and rms value of the waveform.<br>  <br><br><br>(d) A series R-L-C circuit has L=20 mH, C= 0.03 μF, and R=120 Ω. Determine the (i) resonant frequency (ii) quality factor (iii) bandwidth between the points at which response is 0.7071 times the peak response (iv) voltage across capacitor and inductor at resonant frequency if AC Supply voltage of 100V maintained across the series circuit. | |
| Q3 | (a) A balanced star connected load with coils of resistance 12 Ω and inductance 142 mH is connected to a balanced three phase supply of 400 V, 50 Hz. Two watt meter method is used to measure power. What are expected readings of wattmeter. Compute the total power.<br>OR<br>(b) A delta connected balanced three-phase load is connected to a three phase 400 V supply. The line current is 20 A and the total power taken by the load is 10 kW. Calculate (i) impedance of each branch (ii) the line current, power factor and the total power consumed if the same load is connected in star. | 10 |
| Q4 | **Solve any three of the following**<br>(a) What are iron losses in the transformer? How they are minimized?<br>(b) Draw an equivalent circuit of the transformer and write an equation of voltage regulation.<br>(c) What kind of DC motor is suitable to be used in applications like cranes, elevators? List the reasons.<br>(d) What are the roles of commutator and brushes in the construction of DC motors.<br>(e) What kind of DC motor is suitable to be used in applications like fans, drilling machine? List the reasons. | 15 |
| Q5 | **Solve any three of the following**<br>(a) Draw the circuit diagram of full wave rectifier with center-tap transformer. Explain operation in brief with input output waveforms.<br>(b) Draw output characteristics of BJT in CE configurations. Mark all operating regions.<br>(c) Draw the circuit diagram of single stage CE BJT amplifier. Explain operation in brief with input output waveforms.<br>(d) What is peak inverse voltage (PIV) of diode? What are minimum values of PIV required in case of half wave rectifier, full wave center-tap and bridge rectifier? | 15 |