

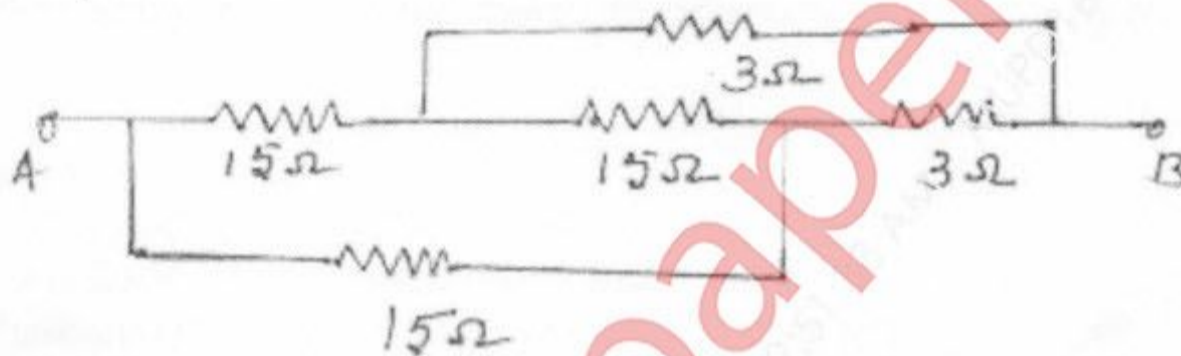


(3 Hours)

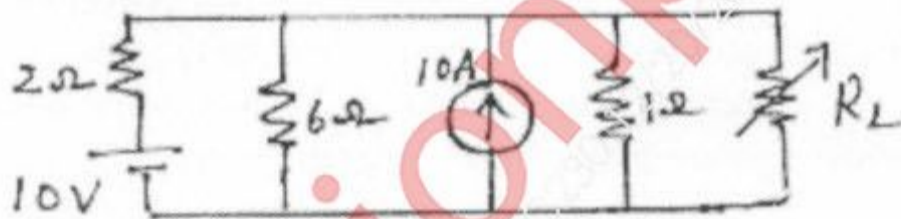
[ Total Marks : 80 ]

- N.B. : (1) Question No.1 is compulsory.  
 (2) Answer any three from the remaining five questions.  
 (3) Assumption made should be clearly stated.  
 (4) Answer to questions should be grouped together and written together.

1. a) Find equivalent resistance across the terminal AB. 3

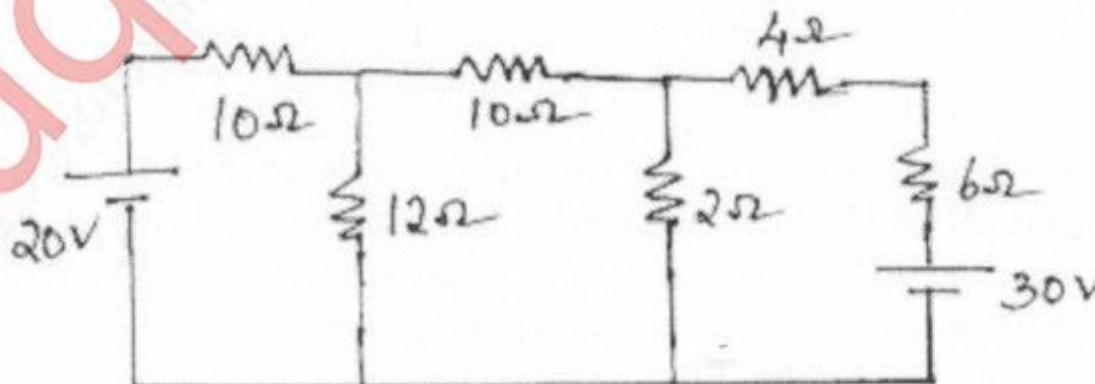


- b) Find load resistance which dissipate maximum power. 3



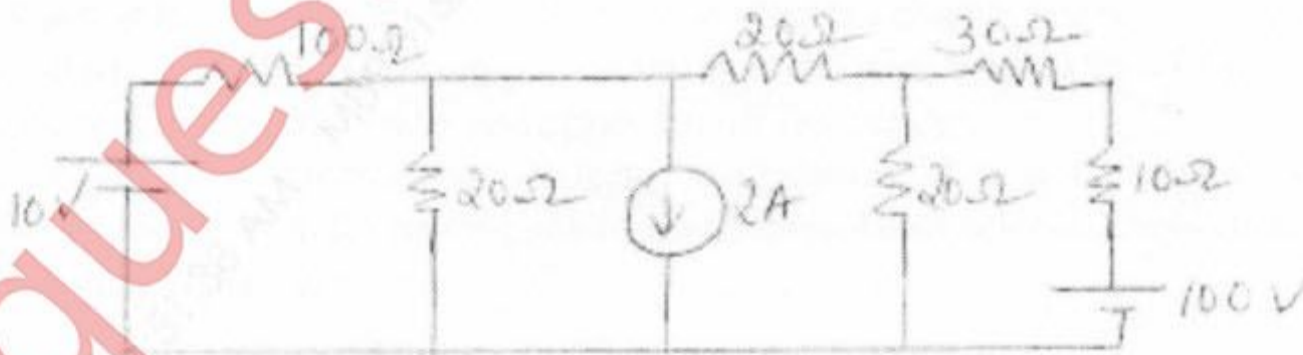
- c) Find the rms value of a sinusoidal waveform. 3  
 d) Draw resonance graph and write any four conditions of series resonance. 3  
 e) Write equations for three phase active power and reactive power along with its units. 2  
 f) Derive the conditions for maximum efficiency of a single phase transformer. 4  
 g) Draw the input and output voltage waveform of a half wave rectifier. 2

2. a) Using Mesh analysis find current through 2 Ω resistor. 6



[ TURN OVER ]

- b) The impedances  $(12) \Omega$  and  $(10 - j20)\Omega$  are connected in parallel and current through  $12 \Omega$  is  $10 \angle 0$ . Determine current through other branch, total current and kVA, kVAR, kW and power factor of the whole circuit. 8
- c) Draw phasor diagram of a single phase transformer connected to a inductive load. 6
3. a) In a delta connected load each phase consists of a resistance of  $100 \Omega$  in series with a capacitor of capacitance  $31.8 \mu\text{F}$ . When it is connected to a  $400 \text{ V}$ , three phase  $50 \text{ Hz}$  supply calculate  
i) the line current ii) Power factor iii) The power absorbed and iv) total kVA 8
- b) A  $50 \text{ kVA}$ ,  $2200/220 \text{ V}$ ,  $50 \text{ Hz}$  single phase transformer gave the following test results. 6  
Open circuit test(H.V side):  $2200 \text{ V}$ ,  $0.5 \text{ A}$ ,  $1000 \text{ W}$   
Short circuit test(H.V side):  $100 \text{ V}$ ,  $20 \text{ A}$ ,  $500 \text{ W}$   
Determine i) Half load efficiency at  $0.8 \text{ pf}$  lagging and  
ii) KV A at which maximum efficiency occurs and maximum efficiency at unity power factor.
- c) With neat circuit diagram and characteristics explain the input and output characteristics of a CE transistor configuration. 4
- d) Draw the circuit diagram and output voltage waveform of a full wave bridge rectifier with capacitor filter. 2
4. a) Find current through  $10 \Omega$  using source transformation. 7

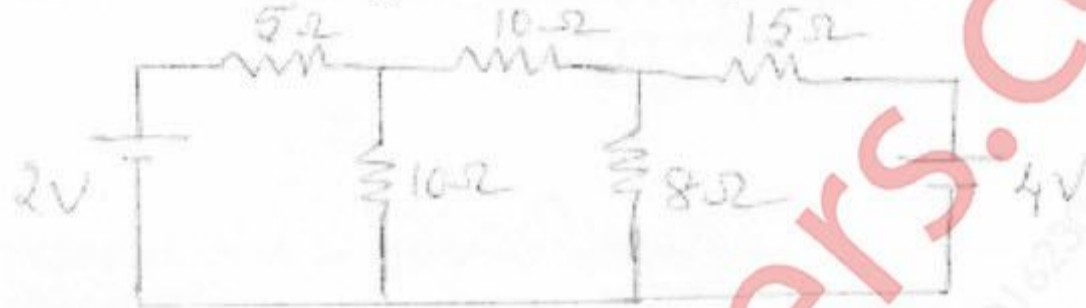


- b) A balanced three phase star connected load has an impedance of  $50 \angle 60^\circ \Omega$  each phase connected across a three phase  $1100 \text{ V}$ ,  $50 \text{ Hz}$  supply. Two watt meters are used to measure power. Find the reading of each wattmeter. 4
- c) An alternating current of frequency  $50 \text{ Hz}$  has a maximum value of  $12 \text{ A}$ . Write down instantaneous current equation. Find the value of current after  $2.77 \text{ ms}$ . Also find time taken to reach  $9.6 \text{ A}$  for the first time. 5

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- d) Derive rectification efficiency and ripple factor of a full wave centre tapped rectifier. 4

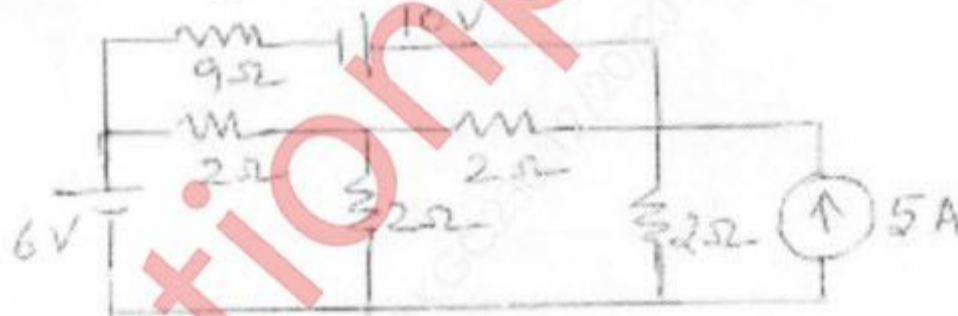
5. a) Calculate the current through  $5\ \Omega$  resistor using Thevenin's theorem. 8



- b) For an RL circuit prove that average power over one complete cycle is  $V_{rms} I_{rms} \cos\phi$ . 4

- c) A 12 kVA, 400/200 V single phase 50 Hz transformer has maximum efficiency of 95 % at 85 % of full load at unity power factor. Determine the efficiency at full load at 0.8 power factor lagging. 8

6. a) Find current through  $9\ \Omega$  resistor using superposition theorem. 7



- b) A series RLC circuit has the following parameter values  $R=10\ \Omega$ ,  $L=0.01\text{H}$ ,  $C=100\ \mu\text{H}$ . Compute the resonant frequency, Q factor of the circuit, band width, lower and upper cut off frequency. 7

- c) Prove that the power and power factor in a balanced three phase circuit can be calculated from the reading of two watt meters. Draw relevant connections and phasor diagram. 6

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