

III-SEM./ELECTRICAL/ EME/ELECTRICAL[PT]/EEE /  
ELECTRICAL(INST & CTRL) 2021(W)

TH-II Circuit & Network Theory

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2  
Figures in the right hand margin indicates marks

1. Answer All questions

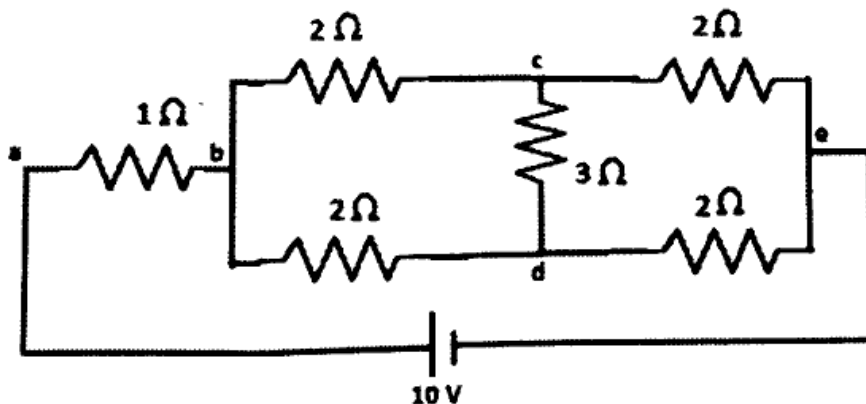
2 x 10

- a. State Ohm's law.
- b. What do you mean by active element. Give two examples.
- c. Define permeability and reluctance.
- d. State KCL & KVL.
- e. Give the statement of Thevenin's theorem.
- f. State the necessary mathematical formulation for conversion from star to delta and vice versa.
- g. Define power factor and power triangle.
- h. Define Q-factor and selectivity in series circuit.
- i. Define coefficient of coupling.
- Write two property of series resonance.

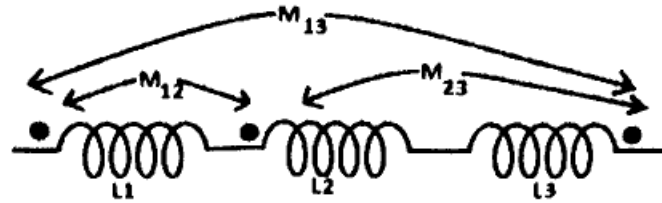
2. Answer Any Six Questions

5X6

- a. (a) Find the power loss in  $1\Omega$  resistor of the figure as shown below.

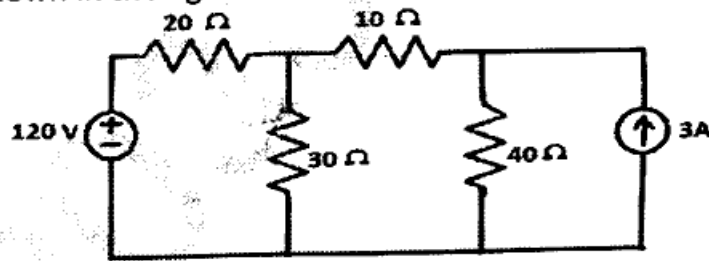


- b. (a) Find the total inductance of the series connected coupled coils as shown below.

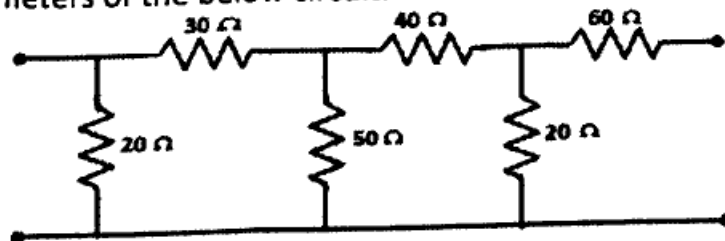


$M_{12}=0.5H, M_{23}=1H, M_{31}=1 H, L_1=2H, L_2=1 H, L_3=2 H$

- c. ✓ Explain briefly about B-H curve.
  - d. ✓ State the condition of resonance in series R,L,C circuit. Derive the expression of resonant frequency for series R,L,C circuit.
  - e. ✓ State and derive the condition for maximum power transfer in a circuit and write the expression for maximum power.
  - f. ✓ Define filter. Classify pass band, stop band filters with neat diagram.
  - g. Briefly explain about the Z,Y,ABCD and h parameters.
- 3 ✓ By using superposition theorem find the current through  $20 \Omega$  resistor of the circuit as shown in the figure below. 10



- 4 Draw the characteristics curve between charging current and time during charging current and time during charging and discharging condition of a series RL circuit. 10
- 5 Design a HPF (both T and  $\Pi$  network) having a cut off frequency of 2 kHz with a load resistance of  $300 \Omega$ . 10
- 6 ✓ Obtain Z-parameters of the below circuit. 10



- 7 ✓ A resistance of  $10 \Omega$ , an inductor of inductance of 20 H and a capacitor of capacitance 100 micro farad are connected to a single phase 230 V AC source. Find (i) current, (ii) power factor, (iii) active power consumption corresponding to supply frequencies of 50 Hz and 100 Hz respectively. 10