

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: BTECH/IMSC
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE/IPH

SEMESTER : I
SESSION : MO/2022

SUBJECT: EE101 BASICS OF ELECTRICAL ENGINEERING

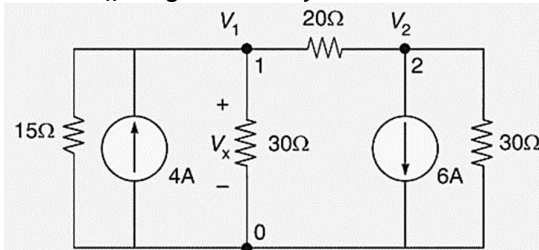
TIME: 3 Hours

FULL MARKS: 50

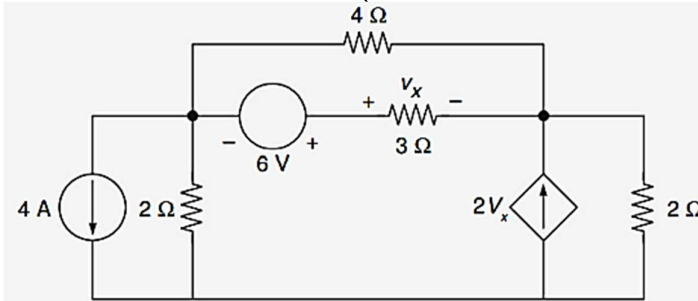
INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Predict V_x using nodal analysis. [5] CO 1,2 BL 3

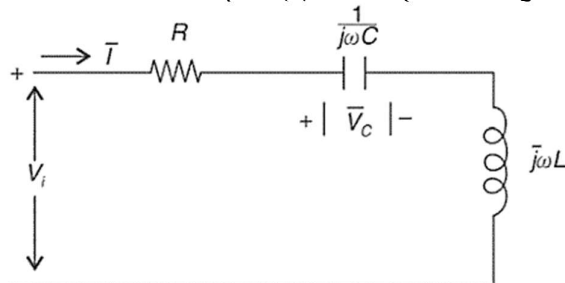


Q.1(b) In the resistive circuit with a dependent source estimate the value of V_x . [5] 1,2 3



Q.2(a) Explain the phenomenon of resonance in series RLC circuit with the help of mathematical expressions and appropriate phasor diagram. [5] 1,2, 3, 5

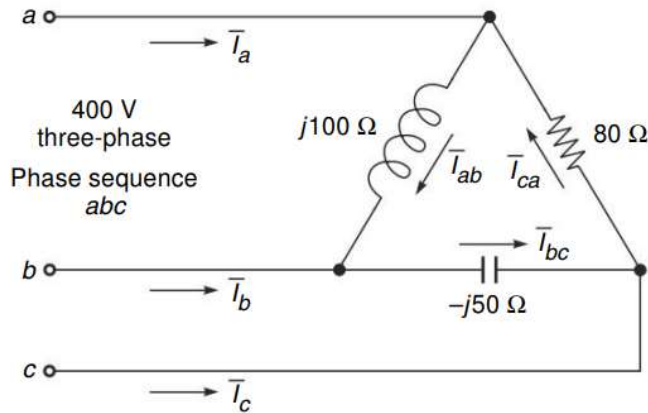
Q.2(b) A capacitor of 12 nF is connected in series with an inductor of 4 mH and 5 Ω resistance. (a) Calculate the resonant frequency, ω_0 (b) At ω_0 the voltage across the capacitor is required to be 1.5V. Propose the voltage which should be applied across the circuit input. (c) Draw a phasor diagram. [5] 1,2, 5



Q.3(a) A balanced 3-phase star-connected load of 120 kW takes a leading current of 100A when connected across a 3-phase, 3.3 kV, 50 Hz supply. Determine the impedance, resistance, capacitance, and power factor of the load. [5] 2,3, 4, 5

Q.3(b) Consider the unbalanced delta-connected load. Find the line currents.

[5] 2,3, 4
5

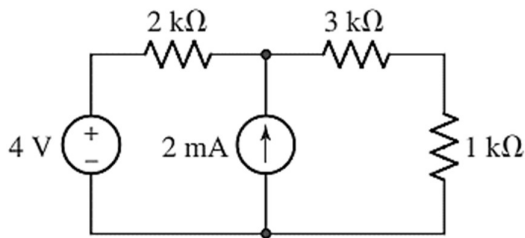


Q.4(a) State and explain superposition theorem. Mention the limitation. Explain the physical basis of dot convention with proper diagrams.

[5] 1,2,3 3
4,5

Q.4(b) Prove maximum power transfer theorem for a dc circuit. Formulate the Thévenin equivalent circuit for the network faced by the $1k \Omega$ resistor.

[5] 1,4, 4
5 5



Q.5(a) Explain with the help of suitable diagrams the working principle of (i) Motor (ii) AC generator.

[5] 1,2,3 2
5

Q.5(b) With the help of suitable diagram, explain the working principle of transformer.

[5] 1,2,3 2
5