PVP 20

Code: 20ES1302

II B.Tech - I Semester – Regular Examinations - FEBRUARY 2022

CIRCUIT THEORY
(ELECTRICAL & ELECTRONICS ENGINEERING)

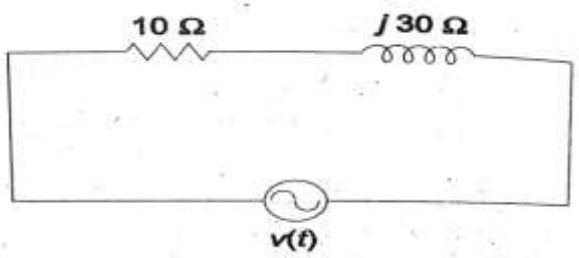
Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Find the total current to the parallel circuit with L = 0.05 H and C = 0.667 μF with an applied voltage of v = 200 sin 5000t volts. 7 M

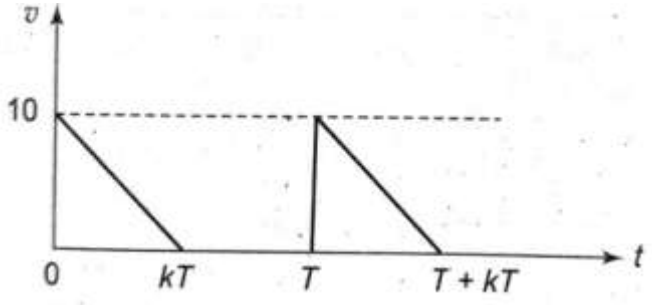
   b) In the circuit shown below, a voltage of $v(t) = 50 \sin (\omega t + 30^{o})$ is applied. Determine the true power, reactive power and power factor.



7 M

OR

2. a) Determine the ' k ' in the waveform shown in the figure., where 'k' is some fraction of the period T such that the effective value is 2.

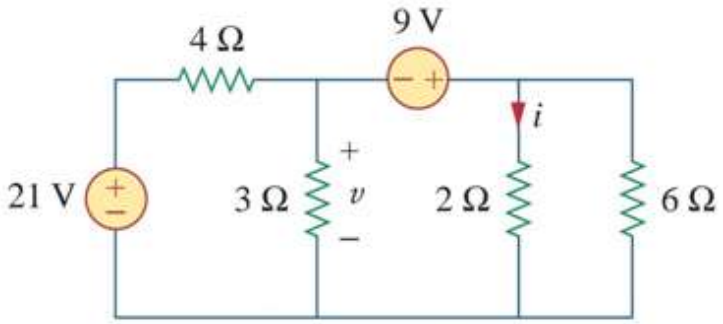


7 M

b) A Resistor having a resistance of 10Ω and a unknown capacitor are in series. The voltage across the resistor is $V_R = 50 \sin (1000\ t + 45^o)$ volts. If the current leads the applied voltage by 60^o, what is the unknown capacitance C ? 7 M

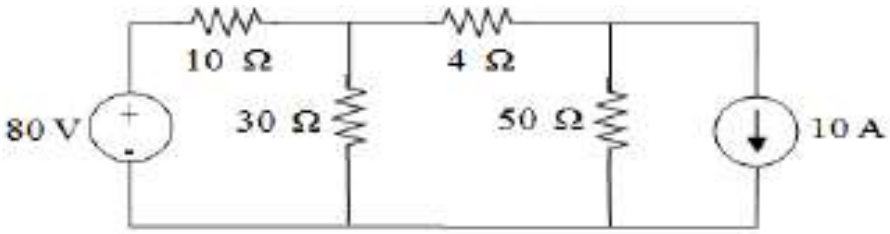
UNIT – II

3. a) Find v and i in the circuit shown in the figure using super node analysis.



7 M

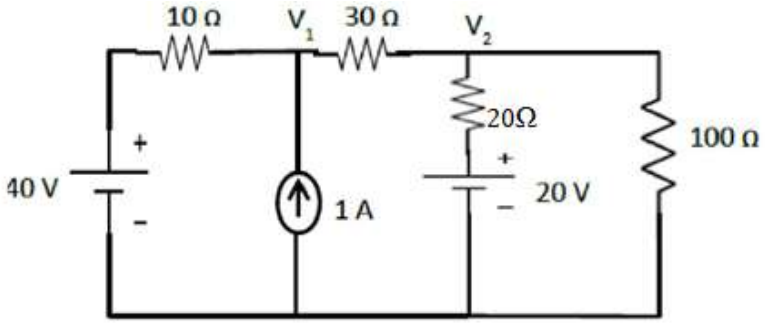
b) Verify Tellegen's theorem for the network shown below.



7 M

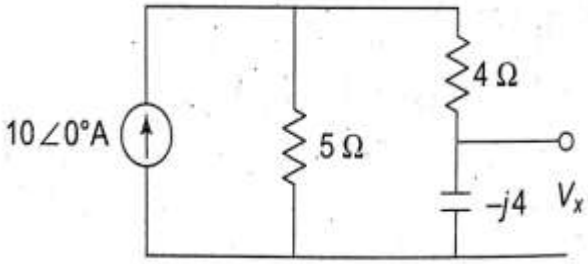
OR

4. a) For the circuit shown in figure below determine the current flowing in 100Ω resistor using Super mesh analysis.



7 M

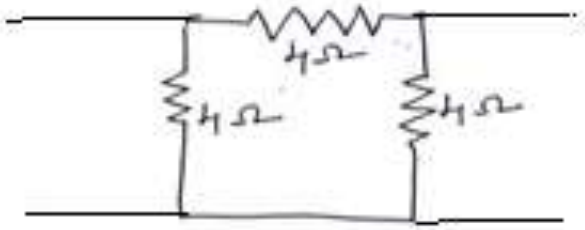
b) Verify Reciprocity theorem for the network shown



7 M

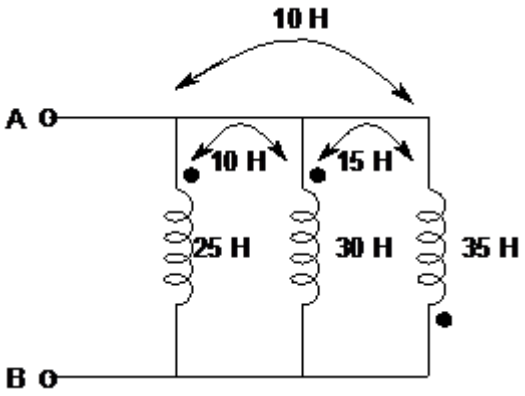
UNIT-III

5. a) Find Y- parameters of the network shown in Figure



7 M

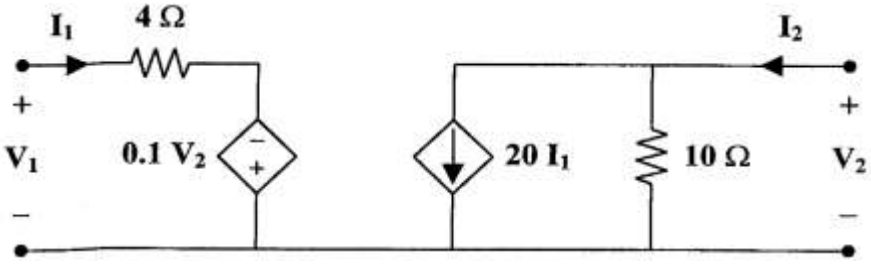
b) Calculate the effective inductance of the circuit shown below across the terminals A and B.



7 M

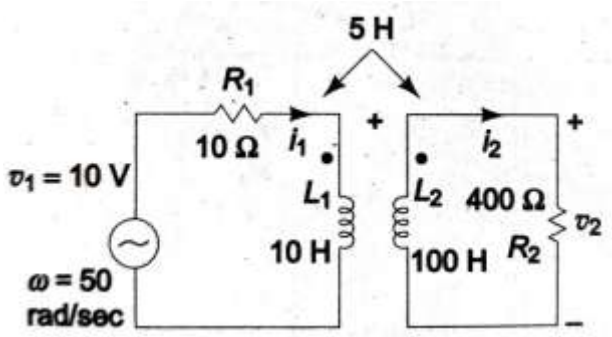
OR

6. a) Determine the Y- parameters from the equivalent circuit for the given two-port network in Figure



7 M

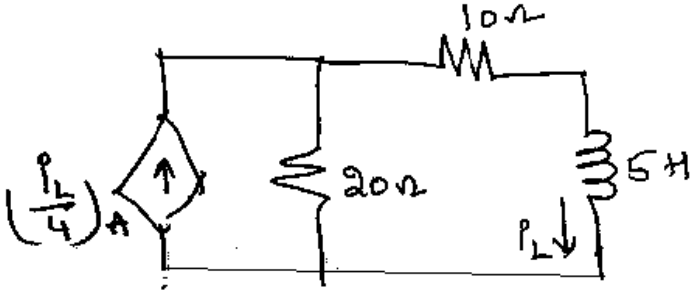
b) For the circuit shown in figure, find the ratio of output voltage to the source voltage.



7 M

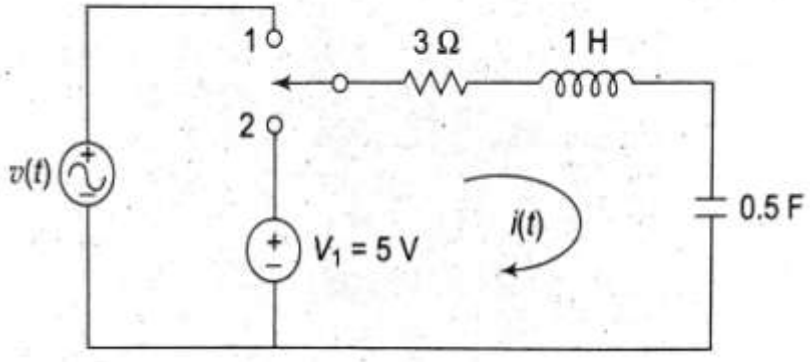
UNIT – IV

7. a) Determine the time constant, $i_L(t)$ and $V_L(t)$ of the circuit shown. Assume $i_L(0) = 10A$



7 M

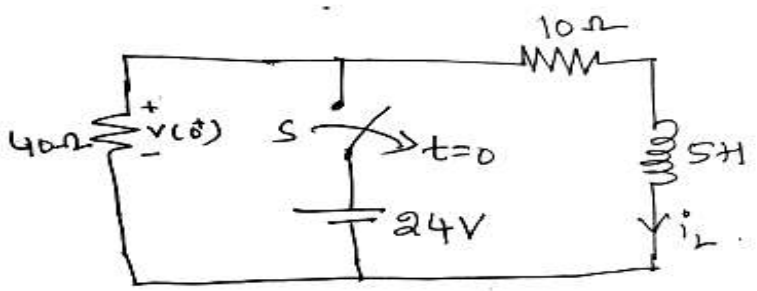
b) Consider the circuit shown below, the switch is thrown from position 1 to 2 at time t=0. Just before the switch is thrown, the initial conditions are $i_L(0^-) = 2$ A, $V_c(0^-)=2$ V. Find the current i(t) after the switch is thrown.



7 M

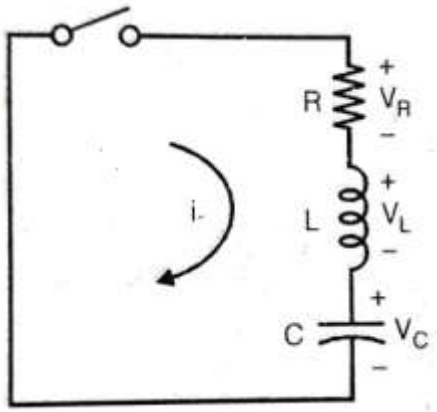
OR

8. a) Determine $i_L(t)$, $i_L(0^+)$ and $V(0^+)$ for the circuit shown in Figure.



7 M

b) In the given figure, R=200 Ω, L= 0.10 H, C=13.33 μF, and $V_c(0^-)$=200 V. Obtain the current transient, if the switch is closed at t=0.



7 M

UNIT – V

9. a) Three equal inductors connected in star takes 5kW at 0.7 power factor when connected to a 400 V, 50Hz three phase, three wire supply. Calculate the line currents (i) If one of the inductors is disconnected, and (ii) If one of the inductors is short circuited. 7 M

b) Sketch the circuit diagram for power measurement in a 3-phase circuit using two wattmeter's and show that total power is given by the algebraic sum of the wattmeter's readings using phasor diagrams. 7 M

OR

10. a) Derive the relationship between line and phase voltages and currents in a three phase star connected system. 7 M

b) Two wattmeter's connected to measure the power in a 440 V, 3 phase balanced system gave readings of 5000 W and 1000 W, Calculate i) Per Phase average power ii) Per phase reactive power iii) Power factor iv)Phase impedance. Assume delta connection. The frequency is 50Hz 7 M