4

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C15

B. Tech. EXAMINATION, 2020

(Third Semester)

(B Scheme) (Re-appear Only)

(EE, EEE)

EE207B

POWER ELECTRONICS DEVICES

Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) Distinguish, at least on four aspects, between Avalanche and Zener diodes. What, if any, is (are) the use(s) of Zener diode ?

   (b) What is the importance of load line ? Does it intersect the transistor characteristics ?

2. (a) Explain the working of transistor.

   (b) Write a short note on LED.

3. Explain the behaviour of MOSFET in enhancement and in depletion modes.

4. (a) What are stabilization factors in the context of transistor biasing ?

   (b) What features of construction and characteristics distinguish the power transistors from the ordinary ones ?

5. (a) What is typical about Shottky diode construction and characteristics. Do such diodes have any negative resistance ? What is the meaning and implications (significance) of negative resistance ?

(b) Can a thyristor be turned off from the gate ? If yes, describe its working.

6. Explain the construction and characteristics of TRIAC. Also state its major uses.

7. Write a detailed note on firing circuits based on ICs and microprocessors.

8. (a) What are the ways of commutation ? Describe any *two* methods of commutation.

(b) What is a snubber circuit ? What is its use ?

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E11

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B. Scheme) (Re-appear Only)

(EE)

EE301B

ELECTRICAL MACHINES-II

Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. Explain the principle of working of a three-phase induction motor. Give Constructional details of an induction motor.

2. (a) Prove that the frequency of rotor induced emf in an induction motor is slip times its stator frequency.

   (b) Draw the nature of torque slip characteristics of three-phase induction motor, using torque equation. Explain the effect of rotor resistance on the characteristics.

3. Explain slip power recovery control method to control the speed of three-phase induction motor.

4. (a) Using double field revolving field theory explain the torque-slip characteristics of a single-phase induction motor and prove that it cannot produce starting torque.

(b) Explain the principle of split phase used in a single phase induction motor. Name different methods employed. Explain any *two* methods.

5. (a) Derive an e.m.f for an alternator. Also derive expression for distribution factor and pitch factor.

(b) A star connected 3-phase 4 pole 50 Hz alternator has a single layer winding in 24 stator slots. There are 50 turns in each coil and the flux per pole is 0.05 Wb. Find the open circuit voltage.

6. (a) Describe two reactance theory of salient pole alternator.

(b) Discuss equivalent circuit and phasor diagrams of an alternator.

7. (a) Discuss and state the conditions necessary for paralleling alternators.

(b) What are the various methods of synchronizing alternators ?

8. (a) What is synchronous condenser ? What are the advantages of installing a synchronous condenser in an electrical system ? Illustrate your answer with an example.

(b) What is hunting and discuss briefly various causes for hunting.

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E12

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B-Scheme) (Re-appear Only)

EE, EEE & IC

EE303B

DIGITAL CONTROL SYSTEMS

Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) What are various time domain models for discrete time systems ? Explain them.

(b) Draw the basic structure of a computer controlled system and explain the role of various blocks.

2. (a) Define continuous and discrete time signals with neat schematics.

(b) Explain with relevant diagrams, the successive approximation type analog to digital converter.

(c) With neat schematic, discuss the sample and hold operations.

3. (a) What is hold operation and how do we achieve it ? Draw the magnitude and phase curves of the zero order hold and compare these curves with those of the ideal low pass filter.

(b) Obtain the Z-transform of the :

(i) cosine function

$$x(t) = \begin{cases} \cos wt, & 0 \le t \\ 0, & t < 0 \end{cases};$$

(ii) $X(s) = \dfrac{1}{s(s+1)}$.

4. (a) Using Jury stability criterion, find if all the poles of the following transfer function lie inside the unit circle on the Z-plane.

$$G(z) = \frac{3z^4 + 2z^3 - z^2 + 4z + 5}{z^4 + 0.5z^3 - 0.2z^2 + z + 0.4}$$

(b) Draw and explain the mapping between the s-plane and the z-plane for the :

(i) Constant frequency loci

(ii) The constant damping ratio loci.

5. What is recursive realization of controllers ? How non-recursive realization is different from the recursive realization ? Describe direct, cascade and parallel forms of recursive realization.

6. (a) What are various tuning rules for digital PID controllers ? Differentiate between the basic approach of Position PID algorithm and Velocity PID algorithm.

(b) Discuss the interconnection of discrete time and continuous time systems and their equivalent transfer functions.

7. Explain the routes to the design of digital controllers. What are the steps involved in the root locus method for the design of digital compensators ?

8. Write short note on digital compensator design using frequency response plots. What are various z-domain specifications of control system design ?

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E14

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B. Scheme) (Re-appear Only)

EE, EEE

EE305B

POWER SYSTEMS-I

Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. Draw the layout of the 66-kV outdoor substation. Name various components and equipment installed. Describe in brief.

2. What is purpose of interconnector in a d.c. ring main distributor ? Derive an expression for the voltage drop for a uniform loaded distributor fed at one end.

3. Deduce an approximate expression for calculating sag in overhead line with conductors suspended between level supports. How the effects of wind and ice can be taken into account in sag calculation ?

4. Derive and draw the π-equivalent model of long transmission line.

5. What are the limitations of solid type cables ? How are these overcome in pressure cable ?

6. The potential across the 6 units of the string is equalized by using graded insulators. If the capacitance of the top insulator is 8C and that of pin to earth is C. Calculate the capacitance of the other units.

   If instead of graded insulators, a guard ring is used to equalize the potential, calculate the capacitance of each link to conductor.

7. What types of DC links are used in present day Power Systems ? Discuss the application of each of these links.

8. What do you understand by corona and radio interference in high voltage transmission systems ?

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E16

B. Tech. EXAMINATION, 2020

(Fifth Semester)

(B-Scheme) (Re-appear Only)

EE, EEE & IC

EE309B

MICROPROCESSOR (8085), INTERFACING AND APPLICATIONS

Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) Draw pin diagram of 8085 microprocessor and discuss basic functioning of each pin.

   (b) Explain the purpose of SID and SOD lines. What is the use of ALE pin in 8085 microprocessor ?

2. (a) Write an ALP for arranging an array of 8 bit unsigned numbers in ascending order.

   (b) With the help of instructions, explain various addressing modes of 8085 microprocessor.

3. (a) Calculate delay associated with the following routine :

```
      MVI  B, 50H
L2 :  MVI  C, FAH
L1 :  DCR  C
      JNZ  L1
      DCR  B
      JNZ  L2
```

   (b) Define instruction cycle, machine cycle and T-state in a microprocessor.

4. (a) Explain priority interrupts of 8085 microprocessor.

   (b) Discuss the SFRs involved with interrupt functioning in 8085 microprocessor.

5. (a) Discuss various operating modes in 8259 A.

   (b) What is a DMA Controller ? Discuss its interfacing with 8085 microprocessor.

6. (a) Write are the various types of write operations used in 8253.

   (b) Draw functional block diagram of 8254 timer and explain the different modes of its operation.

7. (a) Draw and describe D/A converter interfacing with 8085 microprocessor.

   (b) Write an ALP to rotate stepper motor in clockwise and anti-clockwise direction using 8085 microprocessor.

8. (a) Write an ALP to interface DC motor with 8085 microprocessor.

(b) Give basic steps and blocks involved to measure frequency using 8085 microprocessor.

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Roll No. 49

G22

B. Tech. EXAMINATION, 2020

(Seventh Semester)

(B Scheme) (Main & Re-appear)

(EE, EEE)

EE405B

DIGITAL SIGNAL AND IMAGE PROCESSING

Time : 2½ Hours] *[Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) Classify discrete time systems according to different characteristics. Explain with appropriate examples in each category.

(b) Define Cross-correlation and Auto-correlation. Find cross-correlation between the following signals :

$$x(n) = \{1, 2, 4\} \text{ and } y(n) = \{1, 1, 1, 1, 1\}.$$

Also compute auto-correlation of the following signal

$$x(n) = \{1, 1, 2, 1\}.$$

(All sequences have origin at first element).

2. (a) For each of the following input-output relationships, determine whether the corresponding system is linear, time-invariant or both.

(i) $y[n] = x[n + 1] - x[n - 1]$

(ii) $y[n] = x^2[n - 2]$

(iii) $y(t) = t^2 x(t-1)$

(iv) $y(t) = x(t-2) + x(2-t)$

(v) $y(t) = x\left(\frac{t}{3}\right)$

(b) Explain all discrete time signal operations with the help of analytical and graphical representation of appropriate examples.

3. Compute the eight-point DFT of the following sequence : $x(n) = \left\{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 0, 0, 0, 0\right\}$ using the radix-2 decimation-in-time and radix-2 decimation-in-frequency algorithms.

4. Write short notes on the following :
   (a) Sample and hold circuits
   (b) A/D & D/A converter.

5. Explain different types of FIR digital filter structures with the help of a suitable example.

6. Describe any *one* method of IIR filter design. Convert the analog filter with system function :

$$H_a(s) = \frac{s+0.1}{(s+01)^2+16}$$

into a digital TIR filter by means of the bilinear transformation. The digital filter is to have a resonant frequency of $\omega_r = \frac{\pi}{2}$.

7. Explain multistage decimator and interpolators. List the advantages of multistage structures.

8. How is a digital image represented in spatial domain? What are the different components used in image processing system ? Explain the role of each component.

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Roll No. 45

G23

B. Tech. EXAMINATION, 2020

(Seventh Semester)

(B Scheme) (Main & Re-appear)

(EE)

EE407B

POWER SYSTEM OPERATION AND CONTROL

Time : 2½ Hours] *[Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

1. Explain the concept of control area. Discuss the power frequency characteristics of an interconnected system.

2. Describe the components of turbine speed governing system model and derive equation for it.

3. What are the various types of excitation system ? Draw the neat sketch of brushless excitation system and describe it.

4. What are various methods of voltage control in power system ? Describe in detail.

5. Define the voltage stability and voltage collapse. Describe in brief the techniques for prevention of voltage collapse.

6. Describe different methods of improving system stability. Also explain the method for solving swing equation.

7. Derive the transmission loss formula. Also write a short note on economic loading of thermal plants and their coordination.

8. The fuel cost of two units are given by :

$C_1 = 0.2\ P^2_{G1} + 20P_{G1} + 2.7$ Rs/hr

$C_2 = 0.3\ P^2_{G2} + 12P_{G2} + 1.5$ Rs/hr

If the total demand on the generators is 500 MW, find the economical load distribution of the two units.

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H22

B. Tech. EXAMINATION, 2020

(Eighth Semester)

(B Scheme) (Re-appear Only)

(EE)

EE404B

COMPUTER APPLICATION TO POWER SYSTEMS ANALYSIS

Time : 2½ Hours] [*Maximum Marks* : 50

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

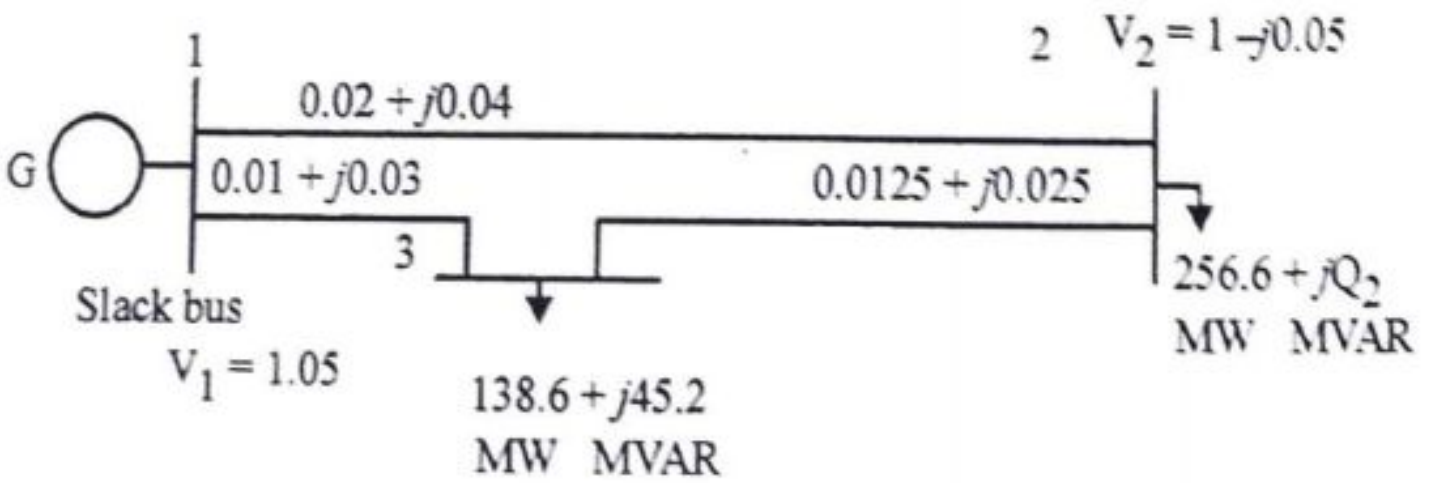
P.T.O.

1. During energizing of transmission line how voltage reaches at steady state at the end of line. Describe the theory of travelling of waves.

2. Write the Power Flow equations and hence plot the receiving end and sending end circle diagram.

3. What do you understand by Fast decoupled NR method ? Describe the strategy and enumerate the final equations.

4. A single line diagram of a simple three bus system are shown below. The magnitude of voltage at bus no. 1 is adjusted to 1.05 per unit. The line impedances marked are in per unit on a 100 MVA base and the line charging susceptances are neglected. Perform the load flow study using the Gauss-Seidel method (one iteration only). 50 MVAR $\leq Q_2 \geq$ 100 MVAR.



5. Derive the formula for fault current for single line to ground fault occurs at bus number – k of power system network. Write the formulas for the fault voltages at all other buses.

6. Show, how sequence impedances of transmission line are not mutual coupled to each other. Write the sequence networks of Synchronous machine and transformers.

7. Describe the method of formation of Z-bus using modification method.

8. Describe the following :

   (a) Bus Admittance Matrix

   (b) Primitive Admittance Matrix

   (c) Bus Incidence Matrix

   (d) Twing Admittance Matrix.

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18C11

B. Tech. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

(EE)

EE201C

ELECTRICAL CIRCUIT ANALYSIS

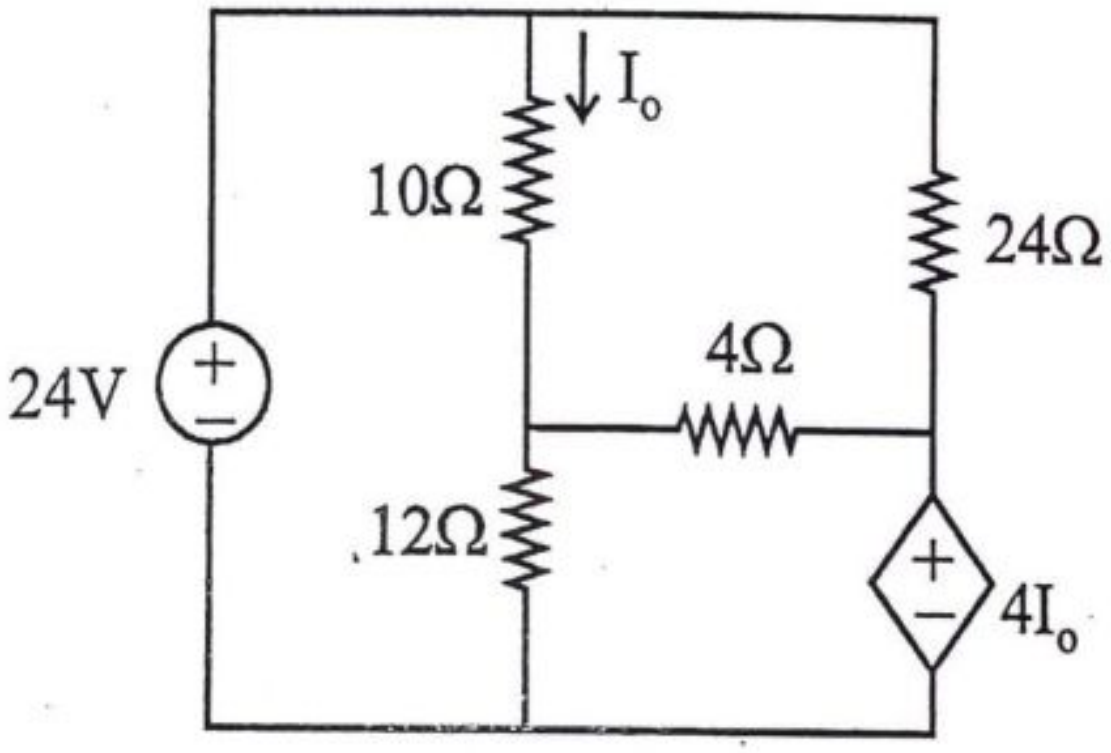
Time : 2½ Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

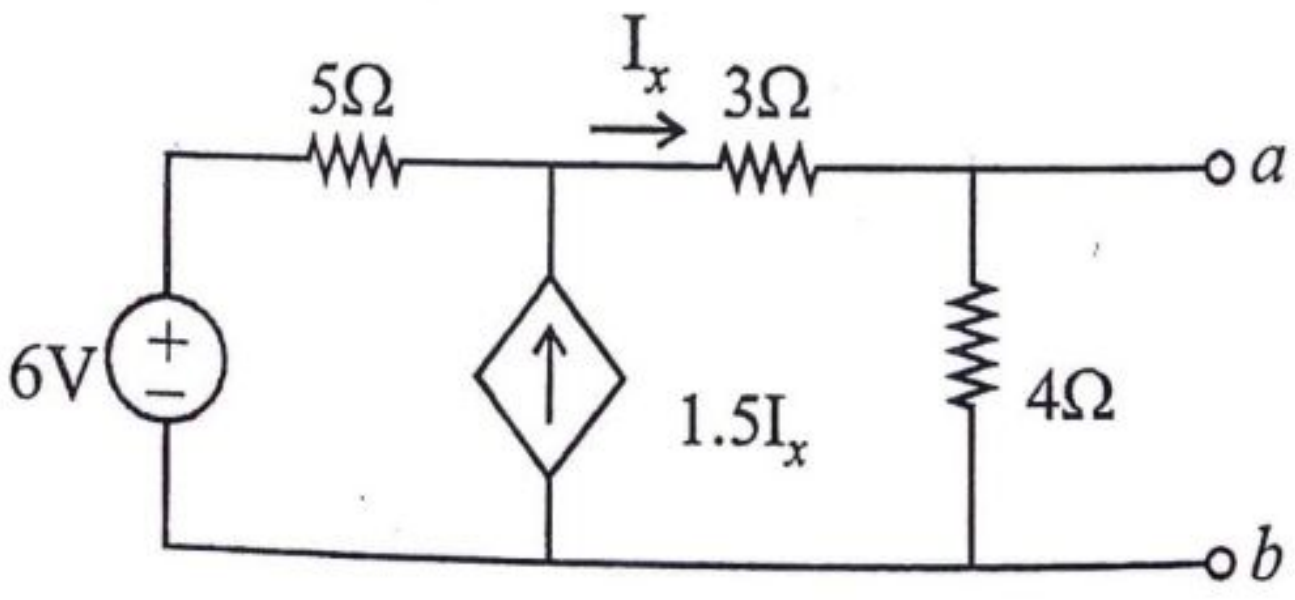
Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) State and explain maximum power transfer theorem for a.c. circuits. Derive the condition for maximum power transfer.

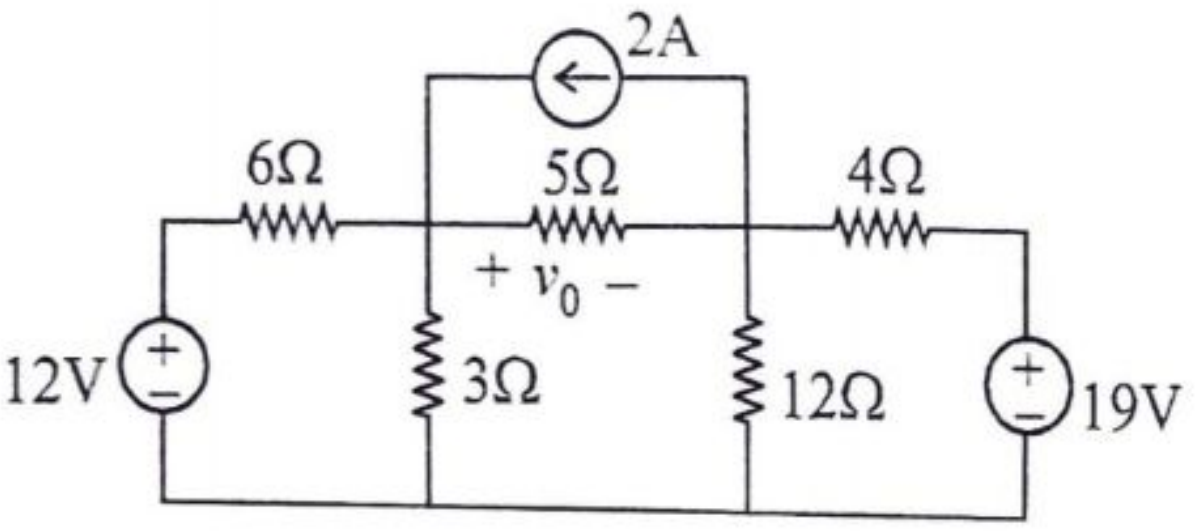
(b) Use mesh analysis to find the current I_o in the circuit.



2. (a) Find the Thevenin equivalent of the circuit at terminals *a*-*b*.

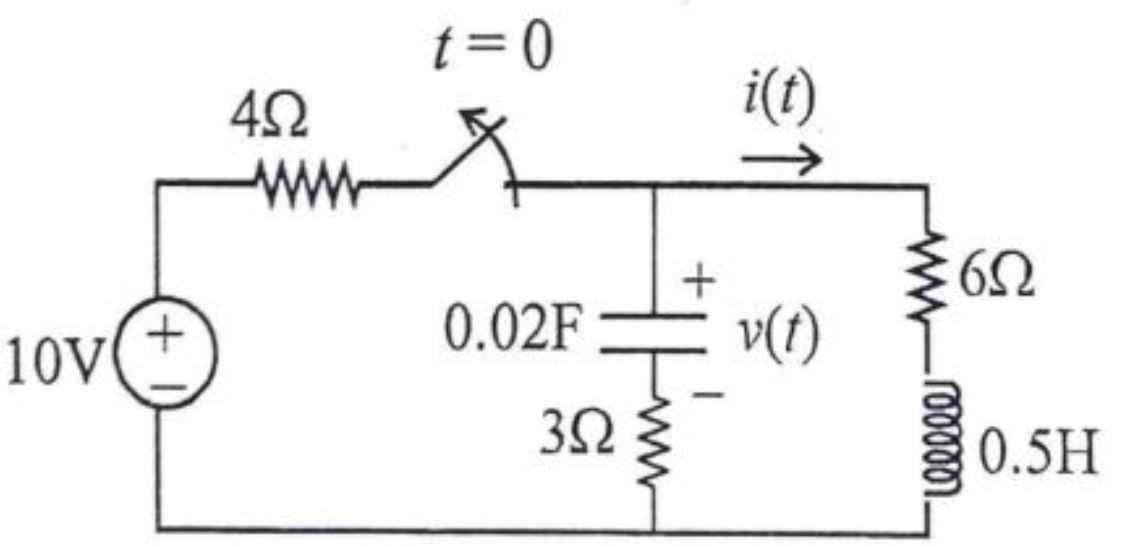


(b) Determine v_0 in the circuit using superposition principle.



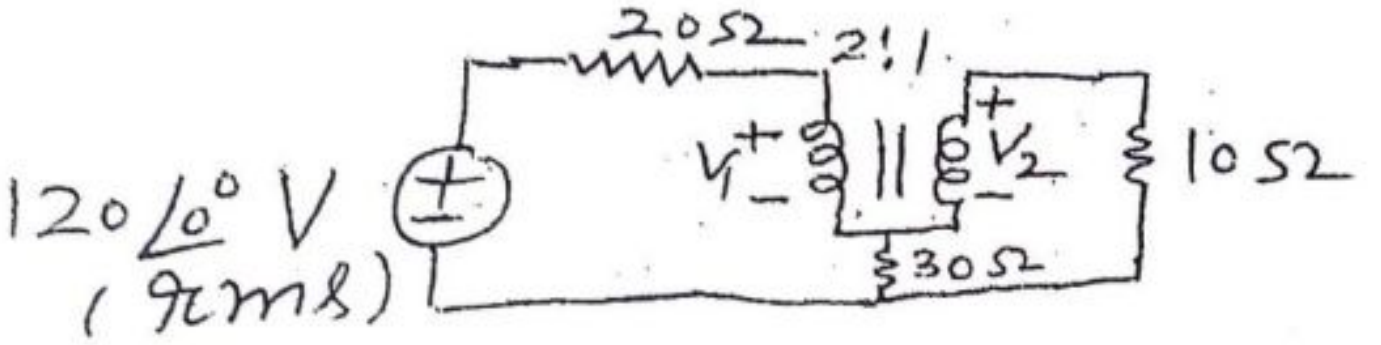
3. (a) What is dot convention ? How does it help in solving magnetically coupled circuits ?

(b) Find $i(t)$ in the circuit. Assume that the circuit has reached steady state at $t = 0$.



4. (a) What are the advantages of three-phase systems over single phase systems ? What is phase sequence and its significance in three-phase systems ?

(b) Calculate the power supplied to the $10\,\Omega$ resistor in the ideal transformer circuit.



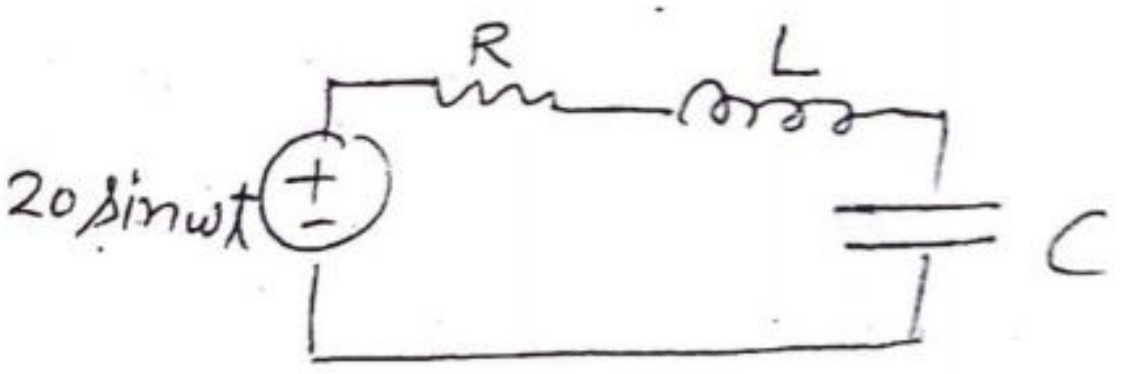
5. (a) What is convolution integral ? Where are its applications ? State and prove convolution theorem.

(b) Find the inverse Laplace transform of

$$F(s) = \frac{(7s+2)}{s^3+3s^2+2s}.$$

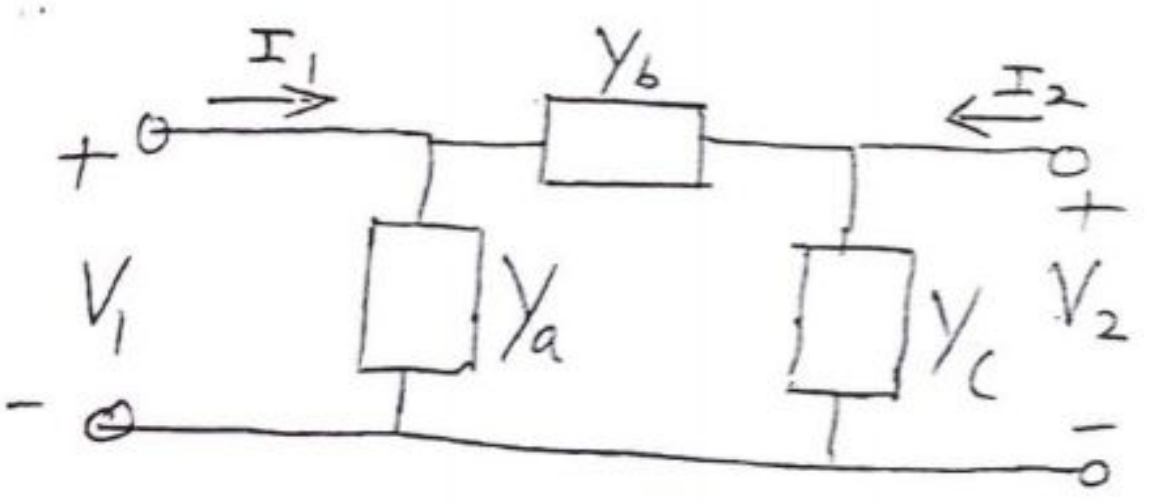
6. Explain the phenomenon of resonance in series R-L-C circuit.

In the circuit, R = 2 Ω, L = 1 mH and C = 0.4 μF. Find the resonant frequency and half power frequencies; quality factor and bandwidth: and amplitude of the current at ω_0, ω_1 and ω_2.



7. (a) Explain the transmission and inverse transmission parameters of a two port network.

(b) Find the *y*-parameters of the pi network.



8. (a) Derive the relationship between ABCD and Z-parameters for a two port network.

(b) Find the hybrid parameters for the given two port network.