

Code: 9A02401

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012

PRINCIPLES OF ELECTRICAL ENGINEERING

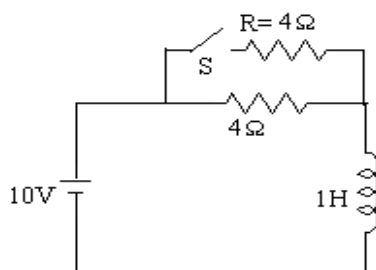
(Common to EIE, E. Con. E, ECE & ECC)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Show that current in a series RL circuit excited by a dc source of voltage V is $I = V/R (1 - e^{-(R/L)t})$ A.
- (b) In the above circuit shown in the fig 'S' is open for a long time so that steady state is reached and at $t = 0$, S is closed. Determine the current $i(t)$ in $R = 4 \Omega$'s by using Laplace transform method.



- 2 (a) Define and obtain open circuit impedance parameters by taking any one example.
- (b) A two port network has the following parameters: $Z_{11} = 20 \Omega$, $Z_{12} = 5 \Omega$, $Z_{21} = 20 \Omega$ and $Z_{22} = 15 \Omega$. Calculate Short circuit parameters.
- 3 Design a T-section constant – K high pass filter having cut-off frequency of 12 kHz and nominal impedance $R_0 = 500 \Omega$. Also find: (i) Its characteristic impedance and phase constant at 24 kHz and (ii) attenuation at 4 kHz.
- 4 What is an attenuator? Explain T-type attenuator and bridged T-type attenuator by deriving necessary equations.
- 5 (a) Explain the type of series generator with neat circuit diagram.
- (b) The armature of a 2 – pole, 220 V Lap wound generator has 400 conductors and runs at 300 rpm. Calculate the useful flux / pole if the number of turns in each field coil is 1200.
- 6 A 50 kW, 440 V, shunt generator having an armature circuit resistance including the inter pole winding of 0.15Ω at normal working temperature was run as a shunt motor on no load at its rated voltage and speed. The total current drawn by the motor was 5 A, including shunt field current of 1.5 A. Calculate the efficiency of shunt generator at full load.
- 7 A single phase transformer working at unity power factor has an efficiency of 90% at both half load, at full load of 600 W. Determine the efficiency at 80% of full load
- 8 Explain the principle of operation and characteristics of AC tacho meters.

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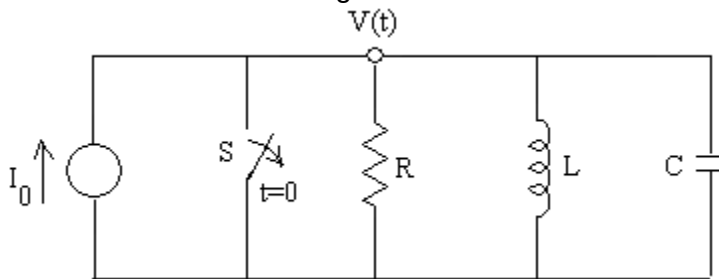
(Common to EIE, E. Con. E, ECE & ECC)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
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- 1 (a) Derive the expression for current when a dc voltage V is applied suddenly (i.e. at time = 0) by closing a switch in a series R-L circuit by using Laplace transform.
- (b) Assuming zero initial conditions, Find $V(t)$ given $I_0=2$ A, $L=0.5$ H, $C=1$ F and $R=0.5$ Ω in the network shown in the fig below.



- 2 a) Define and obtain 'Y' - parameters by taking any one example.
- b) A two port network has the following parameters: $Z_{11}=20$ Ω , $Z_{12}=5$ Ω , $Z_{21}=20$ Ω and $Z_{22}=15$ Ω . Calculate 'Y'- parameters.
- 3 Design an m-derived low pass filter to match a line having characteristic impedance of 600 Ω and to pass signals up to 500 Hz with infinite attenuation occurring at 750 Hz.
- 4 What is an attenuator? Explain T-type attenuator and Lattice attenuator by deriving necessary equations.
- 5 The armature of a 4-pole, lap wound shunt generator has 120 slots with 4 conductors per slot. The flux per pole is 0.05 Wb. The armature resistance is 0.05 ohm and the shunt field resistance 50 ohm. Find the speed of the machine when supplying 450 A at a terminal voltage of 250 V.
- 6 Explain the speed control of DC shunt motor by:
 - (i) Armature voltage control.
 - (ii) Field flux control.
- 7 Explain the constructional details of a single phase transformer.
- 8 Explain the principle of operation and characteristics of AC servo motors.

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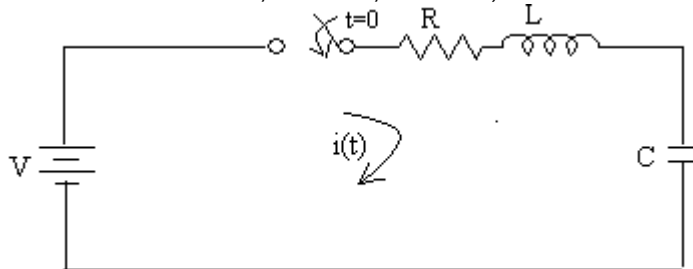
(Common to EIE, E. Con. E, ECE & ECC)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
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- 1 For the network shown in the fig below, determine the expression for $i(t)$. The switch is closed at $t = 0$. Take, $V = 1\text{ V}$, $R = 2\ \Omega$, $L = 1\text{ H}$ and $C = 0.5\text{ F}$



- 2 (a) Define and obtain short circuit parameters by taking any one example.
(b) A two port network has the following parameters: $Z_{11}=20\ \Omega$, $Z_{12}=5\ \Omega$, $Z_{21}=20\ \Omega$ and $Z_{22}=15\ \Omega$. Calculate admittance parameters.
- 3 Design an m-derived high pass filter having a design impedance of $600\ \Omega$, cut-off frequency of 5 kHz and $m=0.35$. Also determine the frequency of infinite attenuation.
- 4 (a) What is an attenuator? Derive the design equations for T-type attenuator.
(b) Design a T-pad attenuator to give an attenuation of 60 dB and to work in a line of $500\ \Omega$.
- 5 The armature of a 4-pole, wave wound shunt generator has 120 slots with 4 conductors per slot. The flux per pole is 0.05 Wb . The armature resistance is 0.05 ohm and the shunt field resistance 50 ohm . Find the speed of the machine when supplying 450 A at a terminal voltage of 220 V .
- 6 State the various methods to control the speed of a DC shunt motor and explain with neat circuit diagrams.
- 7 Explain the principle of operation of single phase transformer under no load and load conditions with neat phasor diagrams.
- 8 Explain the principle of operation and characteristics of capacitor motors.

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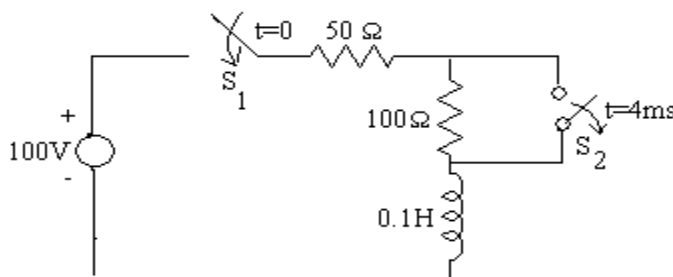
Time: 3 hours

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Answer any FIVE questions
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- 1 (a) Define and Short circuit admittance parameters by taking any one example.
(b) A two port network has the following parameters: $Z_{11}=20\ \Omega$, $Z_{12}=5\ \Omega$, $Z_{21}=20\ \Omega$ and $Z_{22}=15\ \Omega$. Calculate ABCD parameters.

- 2 The circuit shown in fig below, the switch S_1 is closed at $t=0$ and switch S_2 is opened at $t=4\text{ms}$. Obtain 'i' for $t>0$ and sketch it.



- 3 Design a constant K –low pass filter having cut-off frequency 2.5 kHz and design resistance $R_0=700\ \Omega$. Also find the frequency at which this filter produces attenuation of 19.1 dB. Find its characteristic impedances and phase constant at pass band and stop or attenuation band.
- 4 (a) What is an attenuator? Derive the design equations for π -type attenuator.
(b) Design a T-pad attenuator to give an attenuation of 60 dB and to work in a line of $600\ \Omega$.
- 5 A long-shunt compound generator supplies a load at 200 V through a pair of feeders of total resistance 0.04 ohm. The load consists of four motors, each taking 50 A and a lighting load of 100 bulbs each of 50 W. The armature resistance is 0.03 ohm, series field resistance 0.04 ohm and shunt field resistance 40 ohm. Find (i) Load current (ii) Terminal voltage and (iii) emf generated.
- 6 Explain the characteristics of DC motor.
- 7 Discuss the importance of open-circuit and short-circuit tests on a transformer, and also explain the procedure for open circuit and short circuit tests with neat circuit diagrams.
- 8 Explain the principle of operation and characteristics of shaded pole motors.
