

Code.No: A109211001

R09

SET-1

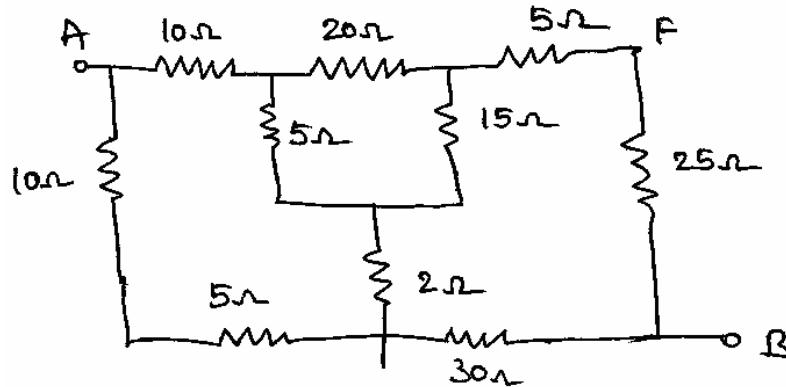
II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
FUNDAMENTALS OF ELECTRICAL ENGINEERING
(COMMON TO EIE, BME, ECC, ICE)

Time: 3 hours

Max.Marks:75

Answer any FIVE questions
All questions carry equal marks

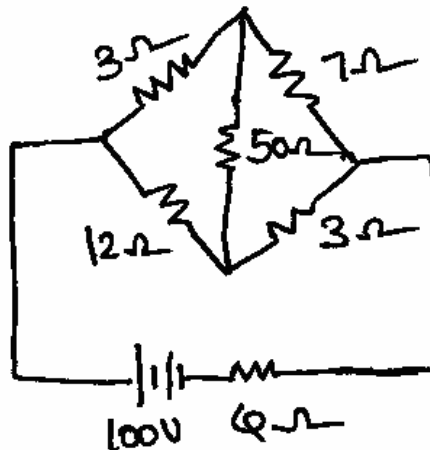
- 1.a) State and explain Kirchoff's laws.
 b) Determine the resistance between the terminals A and B of the network shown in figure using Y/D transformation. [6+9]



figure

- 2.a) State and explain Faraday's laws of electromagnetic induction.
 b) State and explain the concept of dot convention. [8+7]
- 3.a) Define the terms
 i) R. M. S. value ii) Average value iii) Form factor
 b) A current of 5A flows through a non Inductive resistance in series with a choking coil when supplied at 250V, 50 Hz. If the voltage across the resistance is 125V and across the coil 200V. Calculate
 i) Impedance, reactance and resistance of the coil.
 ii) The power absorbed by the coil.
 iii) The total power.
 Draw the vector diagram. [6+9]

- 4.a) State and explain super position and Reciprocity theorems.
 b) Using Thevenin's theorem, find the current through the 50Ω resistor shown in figure. [6+9]



figure

- 5.a) With the help of a phasor diagram, explain how to measure the power in a 3 phase balanced load using two wattmeter method.
b) Explain, how to measure the reactive power of a 3 phase load, using one wattmeter. [8+7]
6. Explain, how the D. C. generators are classified based on excitation. Draw the necessary connection diagrams for all types of generator. Obtain the necessary line current equations in terms of armature and field currents. [15]
7. Explain, how to obtain the equivalent circuit of a single phase transformer by conducting O. C. and SC tests. Explain the test procedure also. [15]
- 8.a) Single phase induction motor is not self starting. Explain.
b) Explain any two methods of starting single phase Induction Motor. [5+10]

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SET-2

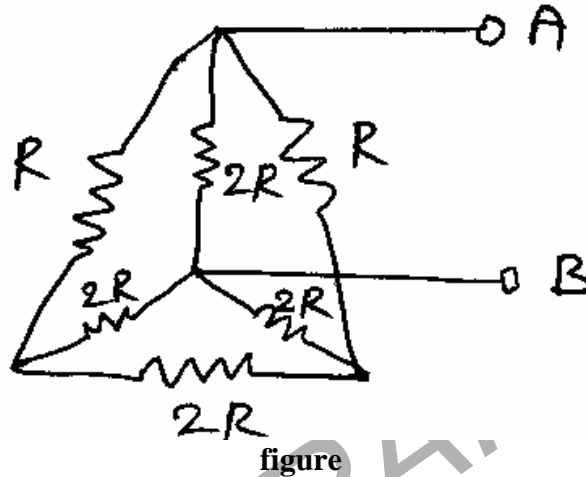
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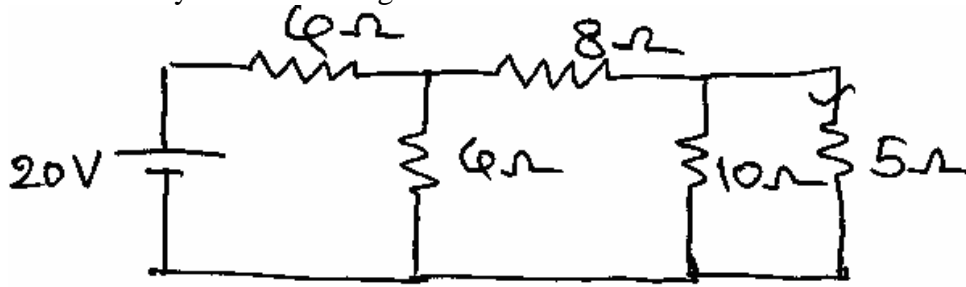
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- 1.a) Plot the V-I characteristics of the following
 i) Independent voltage and current sources
 ii) Practical voltage and current sources
- b) Determine the resistance between the terminals A and B of the figure. [8+7]



- 2.a) State and explain the concepts of self Inductance, Mutual Inductance and coefficient of coupling.
- b) State and explain the concept of dot convention. [8+7]
- 3.a) Two circuits with Impedances $Z_1 = 6 + j8\Omega$ and $Z_2 = 8 - j6\Omega$ are connected in parallel. If the applied voltage to the combination is 100V. Find:
 i) The current and p.f of each branch
 ii) Over all current and p.f of the combination
 iii) Power consumed by each Impedance.
 Draw a neat phasor diagram.
- b) An Inductive circuit of resistance 2Ω and Inductance $0.01H$ is connected to a 250V, 50Hz supply. What capacitance placed in parallel will produce resonance. Find the total current taken from the supply and the current in the branch circuits. [8+7]
- 4.a) A balanced star connected load of $(8+j6)\Omega$ per phase is connected to a balanced 3 phase, 400V supply. Find the line current, power factor and total power.
- b) Deduce the relationship between the phase and $\sqrt{3}$ line voltages of a three phase star connected system. [8+7]

- 5.a) State and explain the Maximum Power Transfer theorem and Reciprocity theorem.
 b) For the circuit shown in figure. Find the current through 5Ω resistor using Norton's theorem. Verify the result using Thevenin's theorem. [6+9]



figure

- 6.a) Explain, how Torque is produced in a D. C. – Motor.
 b) A shunt generator delivers 450A at 230V and the resistance of the shunt field and armature are 50Ω and 0.03Ω respectively. Calculate the generated emf. [8+7]
- 7.a) Develop an emf equation of a DC generator.
 b) Explain the concepts of Band width and Q factor of a series resonance circuit. [8+7]
- 8.a) How to find out the regulation of a single phase transformer. Derive the necessary equation.
 b) Give the classification of single phase Induction Motors. Explain any one. [8+7]

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SET-3

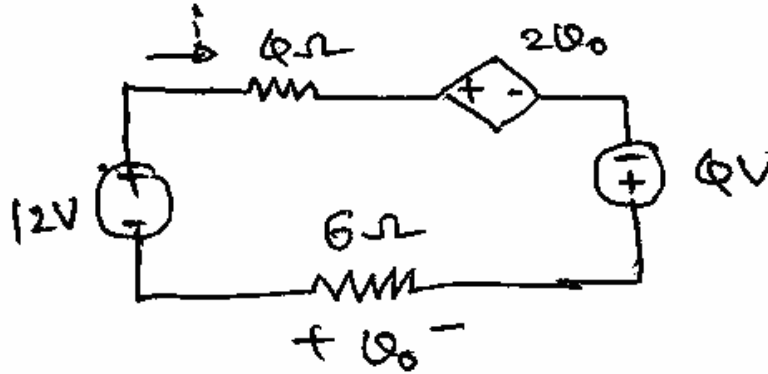
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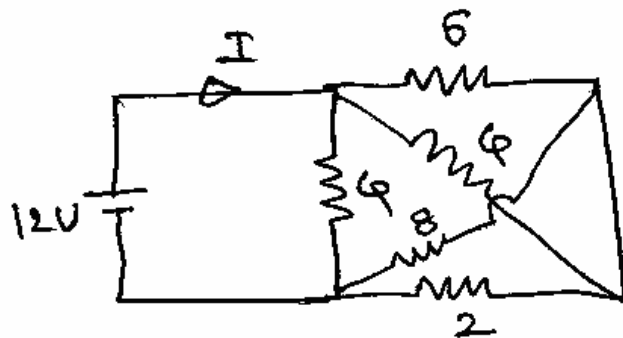
- 1.a) Determine \mathcal{G}_0 and i for the circuit shown in figure.



figure

- b) Compute the value of Battery current I in the figure. All resistances are in ohms.

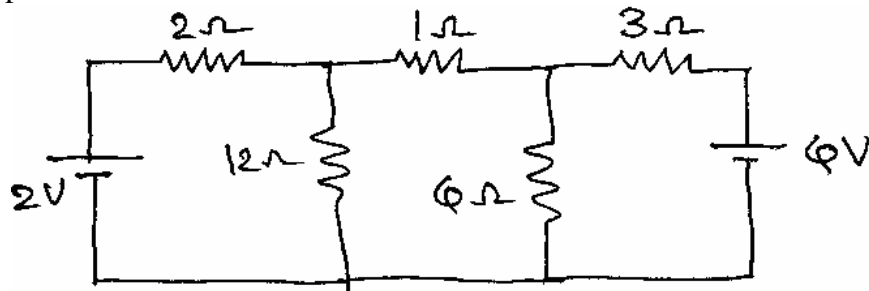
[8+7]



figure

- 2.a) State and explain the concept of dot convention.
 b) Two coils, A of 12,500 turns and B of 16,000 turns, lie in parallel planes so that 60% of flux produced in A links coil B. It is found that a current of 5A in A produces a flux of 0.6 mwb while the same current in B produces 0.8 mwb. Determine:
 i) Mutual Inductance
 ii) Coupling coefficient [7+8]
- 3.a) Explain, what is meant by series resonance. Plot the graphs for current and Impedance of the circuit with respect to frequency.
 b) Two Impedances given by $Z_1 = (10 + j5)$ and $Z_2 = (8 + j6)$ are joined in parallel and connected across a voltage of $\mathcal{G} = 200 + j0$. Calculate the circuit current, its phase and the branch currents. Draw the vector diagram. [8+7]
4. Explain the concept of "Resonance in parallel circuits". Plot the necessary graphs. [15]

- 5.a) A delta connected balanced 3 phase load is supplied from a 3 phase, 400V supply. The line current is 20A and the power taken by the load is 10 kw. Find:
- Impedance in each branch
 - the line current, power factor and power consumed if the same load is connected in star.
- b) Deduce the relation between the phase and line quantities of a 3 phase star connected system. [10+5]
- 6.a) State and explain
- Thevenin's theorem
 - Norton's theorem
- b) For the circuit shown in figure, find the current through 4Ω resistor using superposition theorem. [8+7]



figure

7. Give the classification of D. C. generators. Explain with connection diagrams. [15]
8. With the help of neat diagrams, explain the following:
- Equivalent circuit of a single phase transformer.
 - Constructional details and principle of operation of a single phase induction Motor. [15]

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- 1.a) An Inductor shown in figure (a) is supplied with a current waveform given in figure.
 b) Draw the waveform for the voltage $\mathcal{G}(t)$.

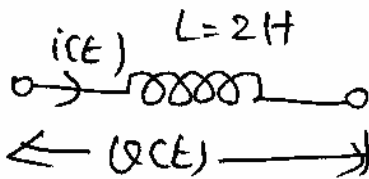


figure (a)

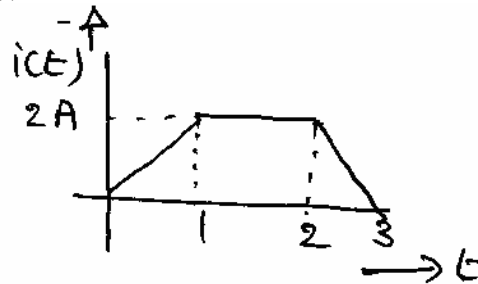
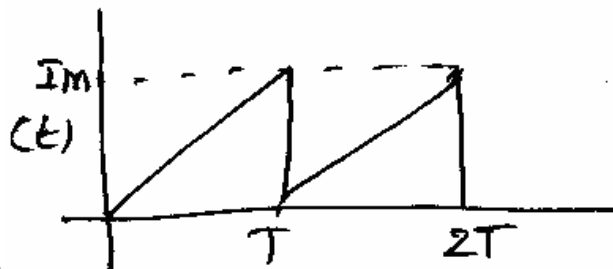


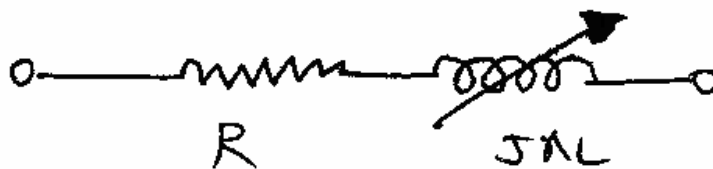
figure (b)

- b) Give the classification of elements of a network. [8+7]
 2.a) Find effective value of the waveform shown in figure.



figure

- b) Obtain the Form Factor of a sinusoidal waveform. [5+10]
 3.a) What is meant by a Locus diagram. Obtain the Impedance Locus of the following series circuit.



figure

- b) State and explain the following theorems.
 i) Tellegen's theorem
 ii) Compensation theorem [8+7]
 4.a) Explain the principle of operation of D. C. Generator. Derive the e.m.f. equation of a D.C.generator.
 b) Explain the principle of operation of D.C. Motor. [10+5]
 5.a) Explain the principle of operation of a single phase Transformer.
 b) Explain, how to find out the Efficiency and Regulation of a single phase Transformer. [5+10]

6. Explain the constructional details, and principle of operation of synchronous generator. [15]
7. Deduce the relationship between phase and line quantities of a 3 phase star connected and delta connected systems. [15]
- 8.a) State and explain Faraday's laws of electromagnetic Induction.
b) Two Identical coils X and Y of 1000 turns each lie in parallel planes such that 80% of the flux produced by one coil links with the other. If a current of 5A flowing in X produces a flux of 0.5 mwb in it. Find the mutual Inductance between X and Y. [15]

FIRSTRANKER