Code No: R5100406 **R5**

I B.Tech YEAR(R05) Supplementary Examinations, May/June 2010
NETWORK ANALYSIS
(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering and Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain what you understand by coefficient of coupling and derive expression for it.
   (b) Two identical coils with L=0.02H have a coefficient of coupling of 0.8. Find mutual inductance and the two equivalent inductances with the two coils connected in series aiding and series opposing. Derive the equations employed.
   (c) An iron ring of 20cm diameter and 5cm2 in cross section is wound with 200 turns. The relative permeability of iron is 500. To establish a flux density of 1wb/m2, Determine the magnetizing current in the coil. [5+7+4]

2. (a) Explain the Dot convention for mutually coupled coils.
   (b) Two coils A & B having 100 and 250 turns respectively are wound side by side on a magnetic material having a c.s.area of 10 cm^2 and a mean length of 150 cms The permeability of the material is 500. Determine the self-inductance of the two coils A & B and mutual inductance between them. If the current in coil A changes from zero to 2A in 0.01 seconds, find the Emf induced in the coil B.
   (c) Derive the relation between the flux density B, and magnetizing force H. Sketch the general shape of B-H curve for both magnetic and nonmagnetic materials. [4+8+4]

3. (a) A coil has a resistance of 60Ω and inductance of 0.2H. What series combination R_C and C connected in parallel with the coil will make the circuit resonant at all frequencies. Derive the relevant equations.
   (b) There are two separate coils when an voltage of 30V D.C is applied to each of the coils the currents taken are 4 and 5A When an A.C voltage of 30V is applied to each of the coils they take 1A and 2 A. If both the coils are connected in series and 100V A.C is applied across the combination, find the current and power consumed by the circuit.
   (c) A series R-C circuit consists of R=10Ω and C=0.1F and a D.C voltage of 20V is applied to the circuit at t=0obtain the current i(t) , V_R(t) and V_C(t) for t>0.Assume that the circuit is initially relaxed. [6+5+5]

4. (a) Define
      i. Active power
      ii. Reactive power and
      iii. Apparent power.
   (b) A coil takes a current of 1A at 0.6 lagging p.f from a 220 volt, 60 Hz single phase source. If the coil is modelled by a series RL circuit. Find
      i. the complex power in the coil
      ii. the values of R and L. [6+10]

5. (a) What is complex power? Explain in detail.
   (b) The current in a given circuit is I=(12-j5)A when the applied voltage is V=(160-j120)V. Determine
      i. the complex expression for power
      ii. power factor of the circuit
      iii. the complex expression for impedance of the circuit
      iv. Draw the phasor diagram. [6+10]

6. (a) A typical two-port network is characterized by the equation $2V_1+4I_2=I_1$ and $V_2+6V_1=8I_2$. Determine the values of
      i. y_{11}
      ii. z_{21} and
      iii. h_{21}
   (b) Obtain the input and output impedances of an amplifier having h_{11}=2Ω; h_{12}=1Ω; h_{21}=5 and h_{22}=2Ω, if it is driven by a source having an internal resistance of 4Ω and is terminated through a load which draws maximum power from the amplifier. [6+10]

7. (a) Give the mathematical representation of attenuation?

   (b) For a symmetrical T and Π sections, show that $Z_{0(T)}.Z_{0(\pi)} = Z_1 Z_2$. Where $Z_{0(T)}$ and $Z_{0(\pi)}$ are the iterative Impedance and Z_1, Z_2 are series and shunt impedances. [6+10]

8. (a) What is an m-derived filter? What is its advantage over a constant k filter? Why is it necessary to use an m-derived filter and a constant filter in tandem?

   (b) Design a low pass m derived T section having a cut off frequency of 2.5KHz, a frequency of infinite attenuation at 2.6KHz and a design impedance of 600 ohm. [8+8]

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