SATHYABAMA UNIVERSITY
(Established under section 3 of UGC Act,1956)

Course & Branch: B. E. – ECE/E&C/ETCE
Title of the paper: Circuit Theory
Semester: III   Max. Marks: 80
Sub.Code: 513302/517303/525302   Time: 3 Hours
Date: 16-11-2006   Session: FN

PART – A   (10 x 2 = 20)
Answer ALL the Questions

1.   State Kirchoff's voltage and current law.
2.   Find the resistance 'R' in the circuit shown in fugure.

Diagram

3.   Two coils A and B are connected in series to a supply of 230V, 50Hz. Coil A has an inductance of 0.2H and a resistance of 20Ω and coil B has an inductance of 0.05H and resistance of 60Ω. Calculate the current.
4.   Define Q factor and give expression for quality factor in terms of R,L and C.
5.   State Millman's theorem.
6.   Define Norton's theorem and sketch the Norton's equivalent.
7.   State the relationship between step and ramp function.
8.   What is the laplace transform of sinwtuct?
9.   State Faraday's law of electro magnetic induction.
10.   If the value of two inductances are 64µH and 81µH and mutual inductance between them is 0.05µH, determine the value of the coupling co-efficient K.

11. Using mesh analysis, find the load current and power delivered to the load.

Diagram

(or)

12. (a) Write expression for delta to star and star to delta conversion of electrical networks.

(b) Determine the equivalent resistance a cross the terminals A and B shown in the figure below.

Diagram

13. (a) Define the terms Resonant frequency and Bandwidth with reference to RLC resonance circuits.   (4)

(b) In a series RLC circuit of R = 100 hms, L = 10mH and C = 1 micro farad,, determine the Resonant frequency, Q factor and Bandwidth. If the voltage applied in 200V, determine the current at resonance.

(or)

14. (a) Find the value of L for which the circuit given is resonant at frequency $\omega = 10,000$ rad/sec

Diagram

(b) A series RLC circuit consists of R = 4Ω; L = 0.5H and a variable capacitance in series across a 100V, 50Hz supply. Calculate the capacitance at resonance and the voltage across inductance and capacitance.

15. Find current I using superposition theorem for the circuit shown in figure.

Diagram

(or)

16. Find the voltage V across 12Ω resistance using Norton's theorem for the circuit shown in the figure.

Diagram

17. Find the output of the system shown in figure for the input $u(t) = 5$ $u(t) + e^{-2t} u(t)$

Diagram

(or)

18. (a) Explain the sinusoidal steady state response of a simple RLC series circuit with Phasor diagram.

(b) Find the poles and zeroes of the circuit impedance shown below.

Diagram

19. Two magnetically coupled coils are connected in series and their total effective Inductance is found to be 4.4 mH. When one coil is reversed in connection, the combined inductance drops to 1.6 mH. All the flux due to the first coil links the second coil, but only 40% of flux due to second coil links the first coil. Find the self inductance of each coil and mutual inductance between coils.

(or)

20. Explain 3 phase 3 wire and 4 wire circuits.