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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.



**Question Paper Code: 8012**

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020

Third Semester

Electrical and Electronics Engineering

U15EE303 – ELECTRIC CIRCUIT THEORY

(Regulation 2015)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

PART – A

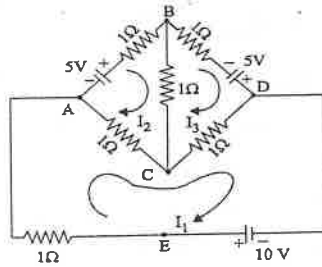
(10 x 2 = 20 Marks)

1. What are dependent and independent sources?
2. Distinguish between mesh and loop of an electric circuit
3. State maximum power transfer theorem for DC circuits
4. Explain the purpose of star-delta transformation.
5. Define self inductance and mutual inductance of a coil.
6. Define bandwidth of a resonance circuit.
7. At what condition, wattmeter readings are equal in a two wattmeter method.
8. List the methods used for power measurement with single wattmeter
9. Write down the condition, for the response of RLC series circuit to be under damped for step input.
10. Define time constant of RC Circuit.

PART - B

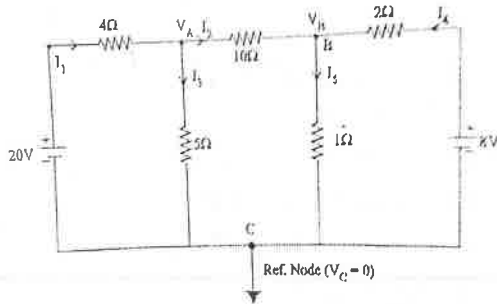
(5 x 13 = 65 Marks)

11. a) Determine the currents in the bridge by mesh analysis in figure given below

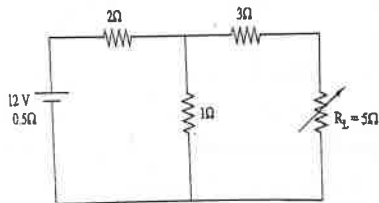


(OR)

- b) Using nodal method, determine the current in  $10\Omega$  resistor.

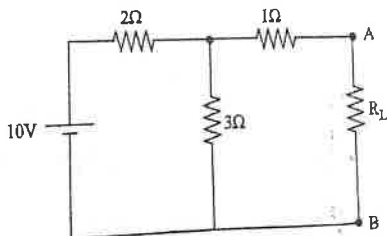


12. a) Calculate the current through the  $5\Omega$  resistor using Thevenin's theorem.

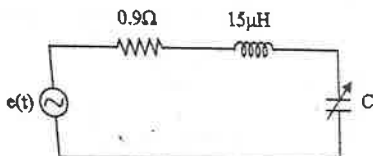


(OR)

- b) Determine the value of  $R_L$  at which maximum Power is transferred to  $R_L$ .



13. a) The signal voltage in the circuit shown in figure is  $e(t) = 0.01\sin(2\pi \times 455 \times 10^3 t)$  V. What should be the value of C in order that the circuit would resonate at this signal frequency? At this condition, find the value of I,  $V_C$ , Q and bandwidth of the circuit.



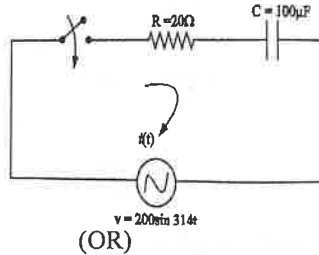
(OR)

- b) A coil having an inductance of 100mH is magnetically coupled to another coil having an inductance of 900mH. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance if the two coils are connected in 1. Series aiding 2. Series opposing 3. parallel aiding and 4. Parallel opposing.
14. a) A three phase balanced load has  $10\Omega$  resistance in each of its phases. The load is supplied by a 220V, 3-phase source. Calculate the power absorbed by the load if it is connected in wye. Calculate the same if it is connected in delta.

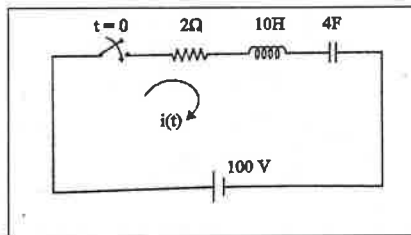
(OR)

- b) Two wattmeters are connected to measure power in a three phase circuit. The reading of one of the meter is 5kW, when the load power factor is unity. If the power factor of load is changed to be 0.707 lagging, without changing the total input power, calculate the readings of the two wattmeter.

15. a) A series RC circuit has  $R = 20 \Omega$  and  $C = 100 \mu\text{F}$ . a voltage  $v = 200\sin 314t$  is applied. Find the value of current after 1ms from the switching instant.



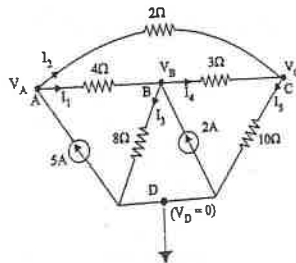
- b) In the RLC circuit the capacitor has an initial voltage of 40V. When the switch is closed at  $t = 0$ , find the expression for the current  $i(t)$ .



PART - C

(1 x 15 = 15Marks)

- 16 a) Determine the branch voltages in the network shown below.



(OR)

- b) Elaborate the expression for total power in the 3 phase balanced circuit using two wattmeters.