



**B.E DEGREE EXAMINATIONS: DEC 2014**

(Regulation 2013)

Second Semester

**U13ECT201: CIRCUIT THEORY**

(Common to ECE & EIE)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

- The maximum current that a 2W, 80k $\Omega$  resistor can safely conduct is
  - 160 kA
  - 40 kA
  - 5 mA
  - 25  $\mu$ A
- Under balanced condition the conversion formula for transforming wye network to and equivalent delta network is.....
- The current through a branch in linear network is 2 A when the input source voltage is 10 V. If the voltage is reduced to 1V and the polarity is reversed, the current through the branch is
  - 2 A
  - 0.2 A
  - 2 A
  - 0.2 A
- Source modeling and resistance measurement using the wheatstone bridge provide applications for..... theorem.
- A function that repeats itself after fixed intervals is said to be
  - a phasor
  - harmonic
  - periodic
  - reactive
- The voltage across an inductor .....the current through it by 90°.
- An RC circuit has R= 2 ohm and C= 4F. The time constant is
  - 0.5s
  - 2s
  - 4s
  - 8s
- .....response is the behavior of the circuit after an independent source has been applied for a long time.
- In order to match a source with internal impedance of 500 ohm to a 15 ohm load, the transformer needed is
  - Step-up transformer
  - Step-down transformer
  - Step-up ideal transformer
  - Step-down ideal transformer

10. Frequency of resonance in RLC series circuit is given by.....

**PART B (10 x 2 = 20 Marks)**

**(Not more than 40 words)**

- 11. State Kirchoff's laws.
- 12. Three resistors  $10\ \Omega$ ,  $20\ \Omega$  and  $30\ \Omega$  are connected in parallel across  $100\ \text{V}$  supply. Compute the current through each resistor.
- 13. Draw the equivalent circuit of Thevenin's theorem.
- 14. Write some applications of maximum power theorem.
- 15. Relate Average power and RMS power.
- 16. Compare mesh and nodal analysis.
- 17. What is the time constant for series RL and series RC circuits?
- 18. How does an inductor act at time(t)  $t=0$  and  $t=\infty$ ?
- 19. What is dot convention?
- 20. Define coefficient of coupling.

**PART C (5 x 14 = 70 Marks)**

**(Not more than 400 words)**

**Q.No. 21 is Compulsory**

- 21. When  $230\ \text{V}$  at  $50\ \text{Hz}$  is applied to an RL series circuit ( $R= 5\ \text{ohm}$ ,  $L=30\ \text{mH}$ ) determine the current, power factor and power dissipated. Draw the phasor diagram.
- 22. a) Determine the value of  $R$  in the circuit shown in Fig.1 when the current is zero in the branch CD.

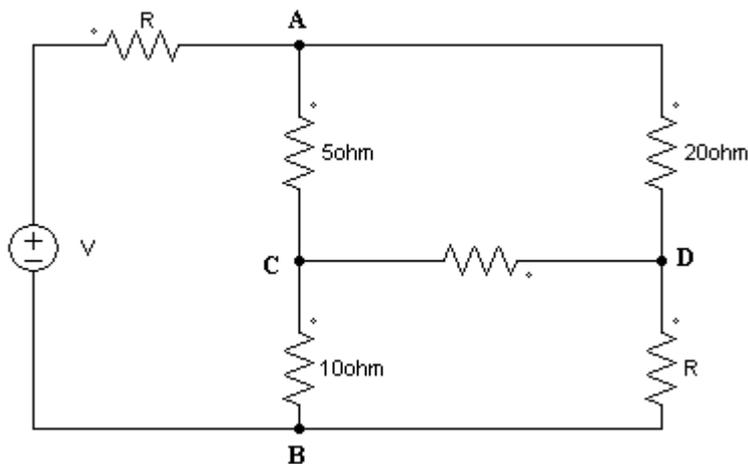


Fig.1

(OR)

- b) Find the voltage between A and B of the circuit shown in Fig.2 by mesh analysis.

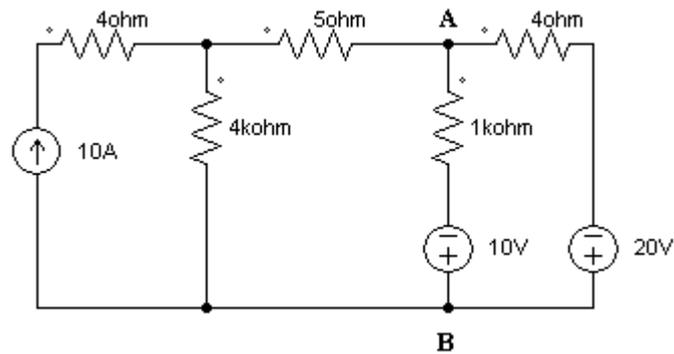


Fig. 2

23. a) Find the current flowing through  $5\Omega$  resistor in the circuit shown in Fig.3 by using principle of superposition theorem.

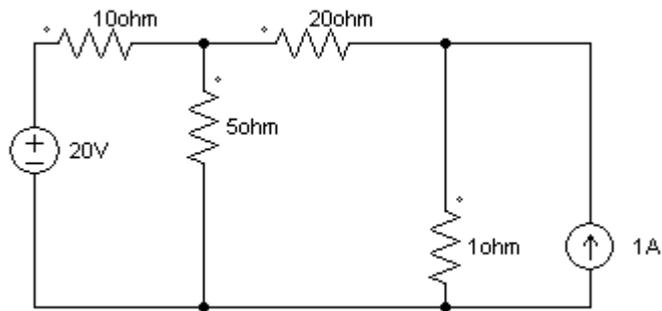


Fig. 3

(OR)

- b) Find the value of R in the circuit shown in Fig.4 so that maximum power is delivered to the load resistance R

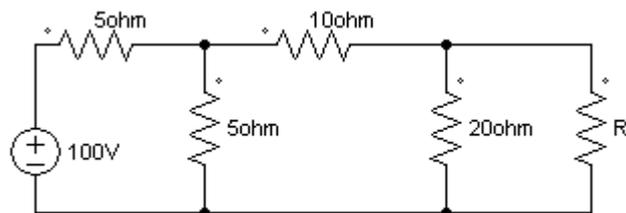


Fig. 4

24. a) Obtain the transient voltages across, the elements R and C in a series RC circuit excited by a d.c. voltage when the switch is closed at  $t=0$ .

(OR)

- b) In the circuit shown in Fig.5 switch is closed at  $t=0$ . Obtain the expression for the current in circuit and find  $i$  at  $t=0.20$  sec.

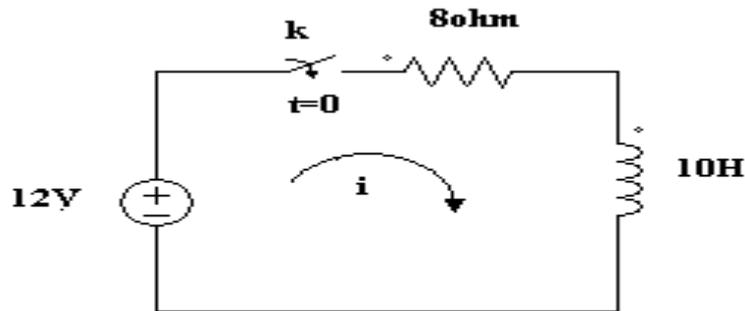


Fig.5

25. a) A series RLC circuit consists of  $50 \Omega$  resistance,  $0.2 \text{ H}$  inductance and  $10\mu\text{F}$  capacitance with applied voltage of  $20 \text{ V}$ . Determine resonant frequency and Q factor of the circuit. Also compute the lower and upper frequency limits and the bandwidth of the circuit.

(OR)

- b) A coil of  $800 \mu\text{H}$  is magnetically coupled to another coil of  $200 \mu\text{H}$ . The coefficient of coupling between two coils is  $0.05$ . Calculate inductance if two coils are connected in, (i) series aiding (ii) series opposing (iii) parallel aiding (iv) parallel opposing

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