Reg. No. : | | | | | | | | | | |

Question Paper Code: 43403

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Electronics and Communication Engineering

14UEC303 - CIRCUIT THEORY

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Super mesh analysis is based on
   (a) KCL and Ohms Law   (b) KVL and Ohms Law
   (c) KCL and KVL   (d) KVL, KCL and Ohms Law

2. A practical current source equivalent consists of
   (a) An ideal current source in series with a resistance
   (b) An ideal current source in parallel with a resistance
   (c) A dependent current source in series with a resistance   (d) A
   dependent current source in parallel with a resistance

3. A circuit has 7 nodes and 5 independent loops. The number of branches in the network is
   (a) 2   (b) 11   (c) 12   (d) 10

4. Maximum power gets transferred to the load when the load impedance is

   (a) equal to zero   (b) equal to one
   (c) equal to source impedance   (d) none of the above

5. What is the Q (Quality factor) of a series circuit that resonates at 6 *kHz*, has equal reactance of 4 *kilo-ohms* each, and a resistor value of 50 *ohms*?

   (a) 0.001   (b) 50   (c) 80   (d)4.0

6. Transient behavior occurs
   (a) Only in resistive circuits
   (b) Only in inductive circuits
   (c) Only in capacitive circuits
   (d) Both inductive and capacitive circuits

7. Dot convention in coupled circuits is used

   (a) To measure the mutual inductance

   (b) To determine the polarity of the mutually induced voltage in coils

   (c) To determine the polarity of the self-induced voltage in coils

   (d) To measure the self-inductance

8. In two wattmeter method of power measurement, when the power factor of load is zero leading or lagging the two wattmeter will give_____ reading.

   (a) Zero   (b) equal

   (c) equal and opposite   (d) not equal

9. For a two port network to be reciprocal

   (a) $Z_{11}=Z_{22}$ (b) $y_{21}=y_{22}$ (c) $h_{21}= - h_{12}$ (d) $AD\text{-}BC=0$

10. An ideal filter should have

    (a) Zero attenuation in the pass band

    (b) Infinite attenuation in the pass band

    (c) Zero attenuation in the attenuation band

    (d) Infinite attenuation in the attenuation band

PART - B (5 x 2 = 10 Marks)

11. State the limitations of ohm's law.

12. State reciprocity theorem.

13. Give the applications of tuned circuits.

14. Define mutual inductance.

15. What is low pass filter?

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16. (b) Find the equivalent resistance between the terminals A and B for the circuit shown in Figure 3 . (16)

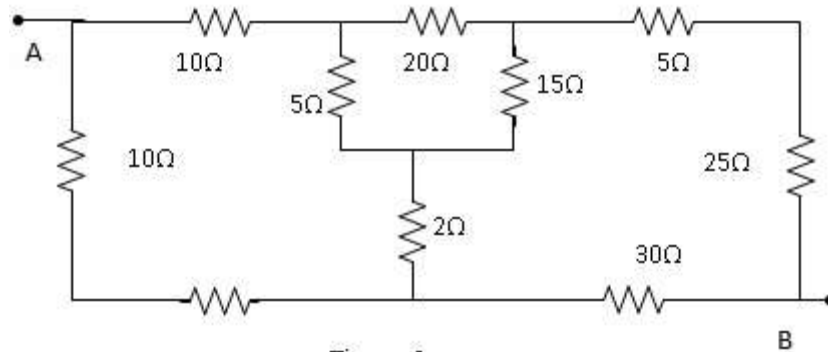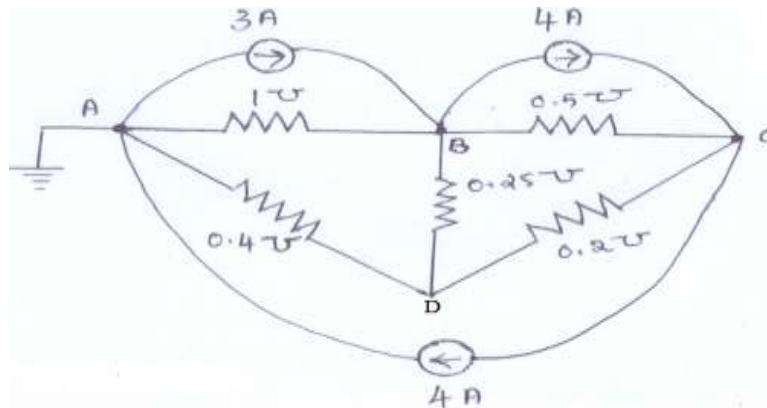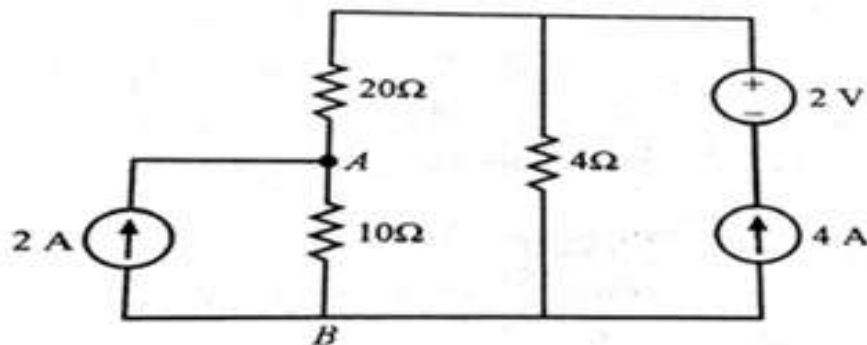
Figure 3

Or

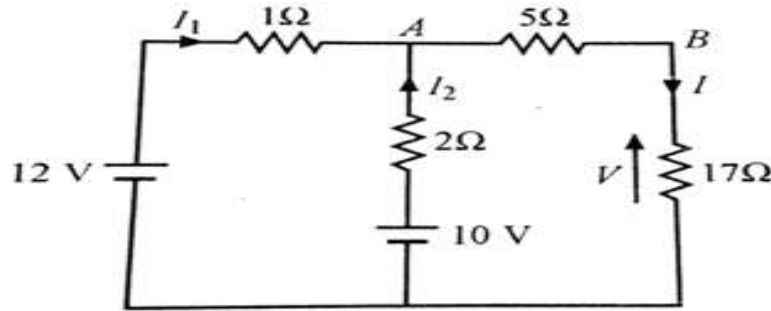(b) (i) Find V_{BD} by nodal analysis for the circuit shown in the figure 2 (10)

(ii) Obtain the expression for star-delta transformation. (6)

17. (a) (i) Determine V_{AB} using superposition theorem in the circuit shown in figure . (16)

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Or

(b) (i) Using Thevenin's theorems find V and I for the circuit shown in figure (14)

Figure

(ii) State reciprocity theorem. (2)

18. (a) A series circuit with $R = 10$ *Ohms*, $L = 0.1$ *H*, $C = 50$ *micro farads* has an applied voltage of 50 *V* with a variable frequency. Determine the resonant frequency, the value of frequency at which maximum voltage occurs across the inductor and the value of frequency at which maximum voltage occurs across the capacitor. (16)

Or

(b) (i) Derive the equation for transient response of RLC circuit for DC input. (12)

(ii) Draw the pole –zero diagram of the given network function

$$I(s) = \frac{5s}{(s+1)(s^2 + 4s + 8)}$$ (4)

19. (a) Two coils connected in series have an equivalent inductance of 0.8 *H* when connected in aiding and an equivalent inductance of 0.4 *H* when connected in opposing. Determine the mutual inductance. Calculate the self-inductance of the coils, by taking $k = 0.55$. (16)

Or

(b) Illustrate the power measurement by two wattmeter method in a three phase system. (16

20. (a) The Z parameters of a two port network are $Z_{11} = 10$ *ohms*; $Z_{22} = 15$ *ohms*; $Z_{12} = Z_{21} = 5$ *ohms*. Find the equivalent *T* network and *ABCD* parameters. (16)

Or

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(b) (i) Design a low pass filter having cut – off frequency of 2 *KHz*, to operate with a terminal load resistance of $500 \, \Omega$. (8)

(ii) Design a high pass filter having a cut-off frequency of 1 *KHz* with a load resistance of $600 \, \Omega$. (8)

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