C   Reg. No. :

Question Paper Code: U2B05

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Second Semester

Biomedical Engineering

21UBM205- Electrical Circuits and Measurements

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. The duality property is   CO1- R
   (a) competitive   (b) mutual   (c) associative   (d) linear

2. Three equal resistances of 3 Ω are connected in star. What is the resistance in one of the arms in an equivalent delta circuit   CO2- R
   (a) 10 Ω   (b) 3 Ω   (c) 9 Ω   (d) 27 Ω

3. What is the total reactance of a series RLC circuit at resonance?   CO2- R
   (a) Equal to X_L (b) Equal to X_C (c) Equal to R   (d) Zero

4. Which amplifier is used in an electronic multimeter ?   CO4- R
   (a) Wideband amplifier   (b)Differential amplifier
   (c) Buffer amplifier   (d) Power amplifier

5. Fuse protection is used for current ratings up to   CO5- R
   (a) 10 A   (b) 20 A   (c) 50 A   (d) 100 A

PART – B (5 x 3= 15 Marks)

6. Explain the source-transformation technique   CO1- U

7. Define reciprocity theorem?   CO2- U

8. What do you understand by resonance?   CO3- U

9. List the difference between CT and PT   CO4- U

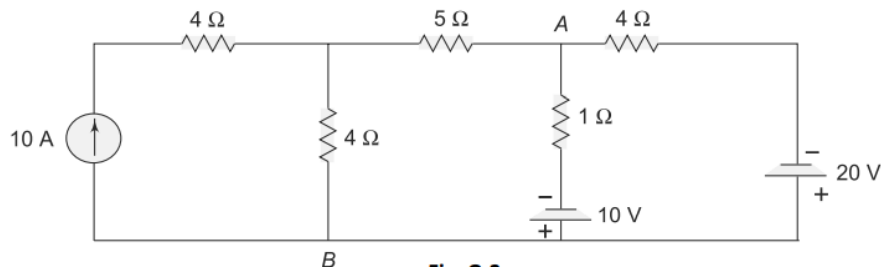10. What is the purpose of earthing ?   CO5- U

<center>PART – C (5 x 16= 80Marks)</center>

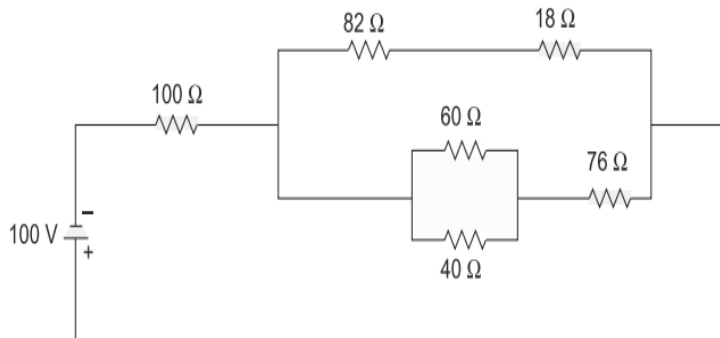11. (a) Find the voltage between A and B of the circuit shown in Fig. by   CO1-App   (16)
       mesh analysis.

<center>Or</center>
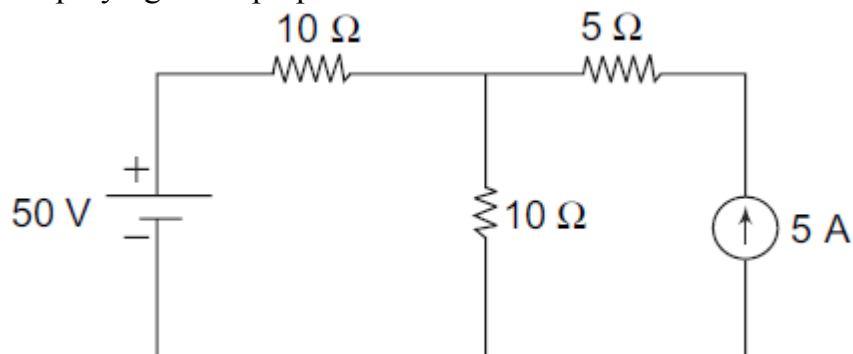
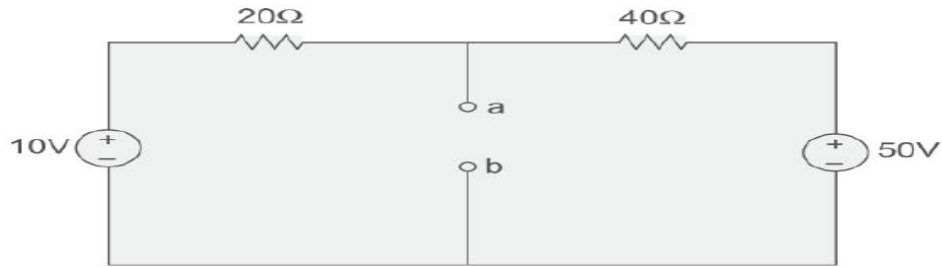   (b) For the circuit shown in Fig., find the total resistance.   CO1-App   (16)

12. (a) Find the current through various branches of the circuit shown in   CO2-App   (16)
   Fig by employing the superposition theorem.

<center>Or</center>

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(b) Find the Thevenin's and Norton's equivalents for the circuit shown CO2-App (16)
in Fig. with respect to terminals ab.

13. (a) A series RLC circuit consists of a 50 V resistance, 0.2 H CO3-App (16)
inductance, and 10 µF capacitor with an applied voltage of 20 V.
Determine the resonant frequency. Find the Q-factor of the circuit.
Compute the lower and upper frequency limits and also find the
bandwidth of the circuit.

Or

(b) In the circuit shown in Fig. a maximum current of 0.1 A flows CO3-App (16)
through the circuit when the capacitor is at 5 µF with a fixed
frequency and a voltage of 5 V. Determine the frequency at which
the circuit resonates, the bandwidth, the quality factor Q and the
value of resistance at resonant frequency
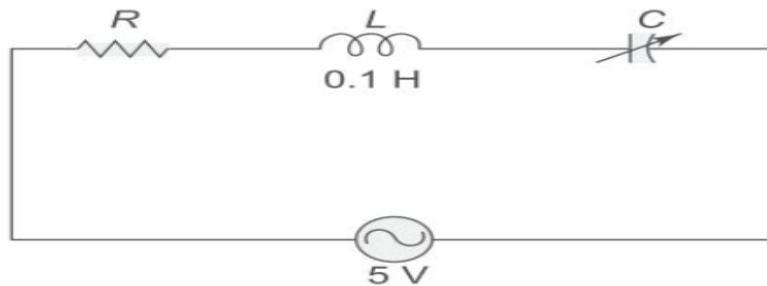
14. (a) Draw and explain the working principle of attraction type, CO4-U (16)
repulsion type moving iron instrument

Or

(b) Elucidate the construction and working principle of an energy CO4-U (16)
meter with necessary circuit arrangement

15. (a) Explain the different cable and wire types with its application CO5-U (16)

Or

(b) What are the basic concepts of household wiring and explain? CO5-U (16)

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