

**Charotar University of Science and Technology [CHARUSAT]**  
**Faculty of Technology and Engineering**  
**Department of Electrical Engineering**  
**Subject: EE 145 Basics of Electronics & Electrical Engineering**  
**First internal exam**

**Semester: 1<sup>st</sup> Sem B.Tech. (CE/CSE/IT/EC)**  
**Date: 01/12/2021 (Wednesday)**

**Maximum Marks: 30**  
**Time: 11:10 a.m. to 12:10 p.m.**

*Instructions:*

- (i) Attempt **all** the questions.
- (ii) Figures to the right indicate **full** marks.
- (iii) Make suitable assumptions and draw neat figures wherever if required.

**Q-1 Answer the Following Questions. (Any Two)**

**[10]**

- A** Write down the comparison between electric and magnetic circuit. (Minimum 10 points)
- B** Derive the equation for Star to Delta and Delta to star transformation.
- C** Define (i). Faradays second law (ii). Electric flux density (iii). Electric field strength (iv). Lenz Law (v). Passive Element
- D** Define capacitance and Derive the equation of capacitance of parallel-plate capacitor for following two cases with necessary figures:

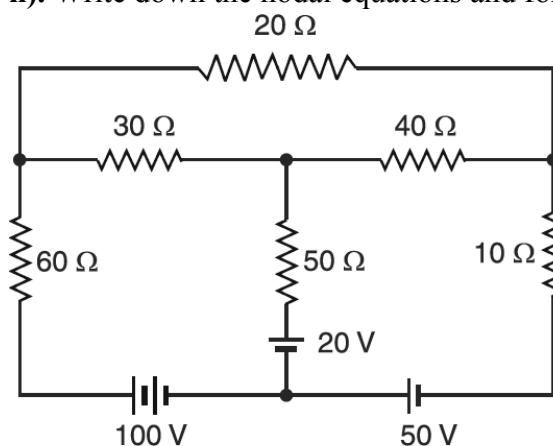
Case-1: With five composite different dielectric medium.

Case-2: Uniform dielectric medium

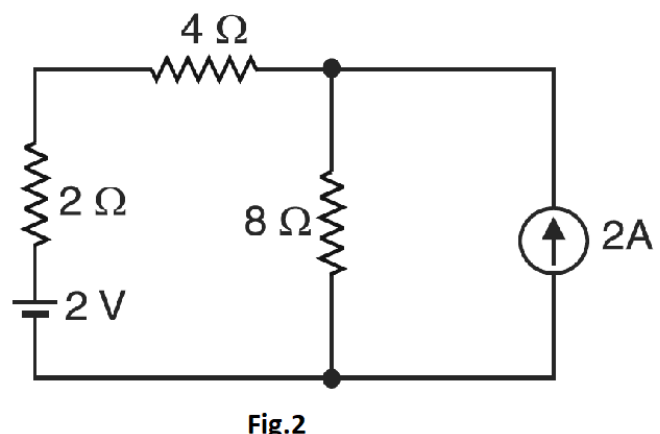
**Q-2 Answer the following. (Any Three)**

**[15]**

- A** i). Write down the mesh equations and form the matrix for the network shown in **Fig.1**.  
 ii). Write down the nodal equations and form the matrix for the network shown in **Fig.2**.



**Fig.1**



**Fig.2**

- B** A network of resistors is shown in **Fig.3**. Find the resistance (i) between terminals A and B (ii) B and C and (iii) C and A.

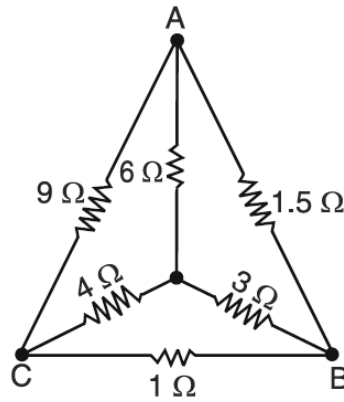


Fig.3

- C** A coil is wound uniformly with 300 turns over a steel ring of relative permeability 900 having a mean diameter of 20 cm, The steel ring is made of a bar having cross-section of diameter 2 cm. If the coil has a resistance of 50 ohms and is connected to 250 V d.c supply. Calculate (a). M.M.F (b). Field intensity in the ring (c). Reluctance of magnetic path (d). Total flux (e). Permeance of ring.
- D** Two capacitors having capacitance of 20  $\mu\text{F}$  and 30  $\mu\text{F}$  are connected in series across a 600 V d.c. supply. Calculate the potential difference across each capacitor. If a third capacitor of unknown capacitance is now connected in parallel with the 20  $\mu\text{F}$  capacitor such that the potential difference across 30  $\mu\text{F}$  capacitor is 400 V, calculate (i) the value of unknown capacitance and (ii) energy stored in the third capacitor.

**Q-3 Answer the Following.**

[5]

- A** If the relative permittivity of medium increases, the electric intensity at a point due to given charge  
**i).** Decreases **ii).** Increases **iii).** Remains same **iv).** None of the above
- B** Find out the range of resistor value with the given set of colors: **Brown, Green, Orange, and Silver.**  
**i).** 13k $\Omega$  to 16 k $\Omega$  **ii).** 1350k $\Omega$  to 1650 k $\Omega$  **iii).** 13500 $\Omega$  to 1650  $\Omega$  **iv).** 13.5k $\Omega$  to 16.5k $\Omega$
- C** For the four band resistor of value 850,000  $\Omega \pm 10\%$ , What is the set of colors?  
**i).** Gray, Green, Yellow, Silver  
**ii).** Green, Yellow, Gray, Silver  
**iii).** Gray, Green, Yellow, Gold  
**iv).** Gray, Green, Yellow, Black
- D** The Capacitance of a parallel plate capacitor depends upon  
**i).** Type of metals used **ii).** Separation between plates **iii).** Thickness of plates **iv).** Potential difference between plates
- E** Ampere\*Turns (AT)/Wb is the unit of  
**i).** Magnetic flux density **ii).** Reluctance **iii).** M.M.F **iv).** Magnetic flux Intensity

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