Dr Himesh Hegade 26/6/2023

National Institute of Technology, Hamirpur (HP)

Name of the Examination: B.Tech

Branch	:	Electrical Engineering	**Semester**	:	2nd
Course Name	:	Basic Electrical Engineering	**Course Code**	:	EE-101

Time: 3 Hour Maximum Marks: 50

Note: All questions are compulsory.
Assume data where ever Necessary.

1. Using nodal analysis find node voltages v_1, v_2 and v_3 in the circuit shown in figure 1. (6)

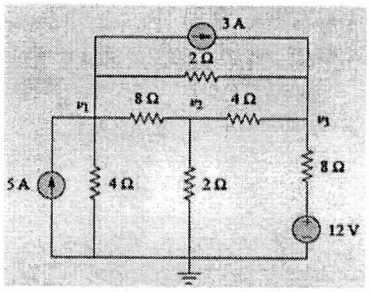

Fig. 1

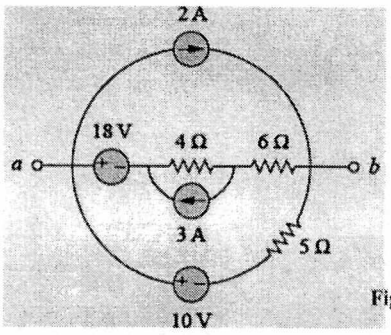

Fig. 2

2. Find the Thevenin's and Norton's equivalent circuits at terminal a-b of the circuit in figure 2. (6)
3. A balanced 3-phase star connected load of 100kW takes a leading current of 80A, when connected across a 3-phase, 1100V, and 50 Hz supply. Find the circuit constants of the load per phase as shown in figure 3. (5)

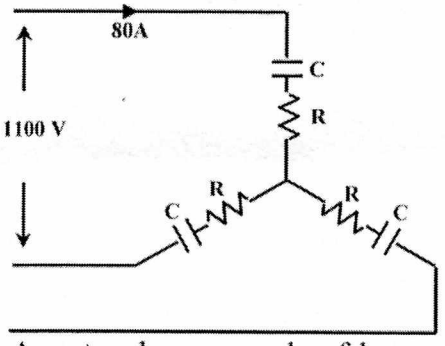

Fig. 3

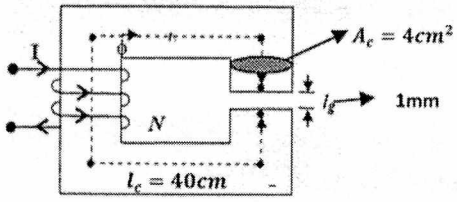

Fig. 4

4. A rectangle core made of low carbon mild steel alloy is shown .The mean length of core (excluding the air gap) is 40cm, and the air gap is 1mm long. The exciting coil has 300 turns. Neglecting leakage and fringing of flux, find the current in the exciting coil to set up a flux of 600 μWb in the air gap. The magnetic field strength H for low for low-carbon mild steel is 3000 At/m. Refer to figure 4. (5)
5. In the figure 5, the capacitor C has capacitance of $25.5\mu F$. The current flowing through the circuit is 0.4 A. If the voltages across different parameters of the circuit are as indicated in the diagram, find the following for this circuit: (i) Frequency of the applied voltage, (ii) Parameters of iron-cored choke coil, (iii) applied voltage, (iv) loss in iron-cored choke coil. (5)

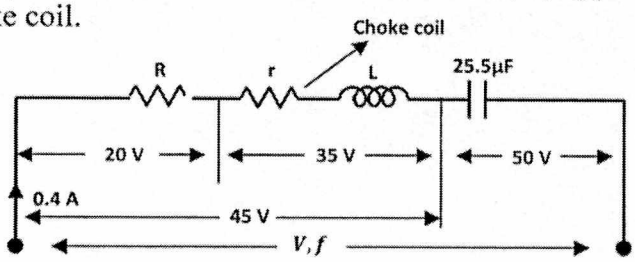

Fig. 5

6. Explain the construction and principle of operation of single phase energy meter. (6)
7. Describe with the help of a diagram the construction and working of moving iron type instruments with particular reference to the means used for deflection, control and damping. (6)
8. Draw and explain the phasor diagram of single phase practical transformer for lagging power factor load. (5)
9. Explain the constructional details of a DC machine giving suitable diagram. (6)