National Institute of Technology, Hamirpur (HP)

Name of the Examination: End Semester Examination.

Branch :   ECE & Chemical   Semester :   1st

Course Name :   Basic Electrical Engineering   Course Code :   EE- 101

Time: 2:00 Hours   **Maximum Marks: 50**

Q1. (a)   Explain the construction and working principle of attraction type moving iron instruments.   (4)

(b)   Name the various types of wiring systems commonly used and explain any of them in detail   (4)
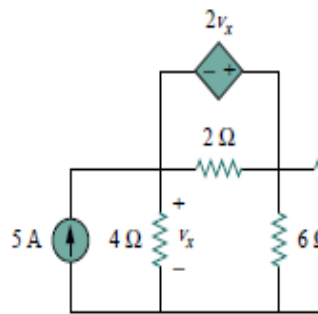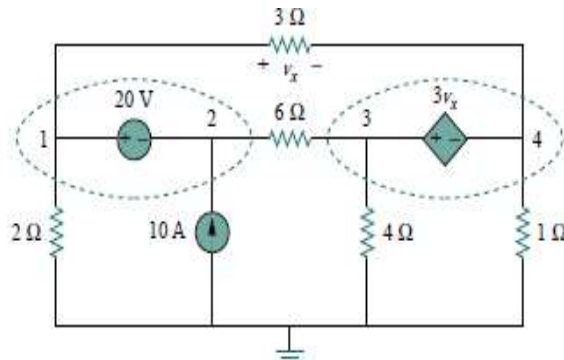

Fig 1   Fig 2

Q2. (a)   Find the Thevenin's equivalent circuit of the given network in Fig 1.   (6)

(b)   For the circuit in Fig 2 find the node voltages using nodal analysis.   (6)

Q3 (a)   Explain in detail the construction and working of DC machine   (5)

(b)   Draw the equivalent circuit diagram of transformer and explain the phasor diagram for leading power factor.   (5)

Q 4 (a)   A 33 KVA 2200/220V, 50Hz, 1- phase transformer has the following parameters: Primary winding (hv) side $R_1 = 2.4\Omega$, $X_1 = 6\Omega$ Secondary winding (lv) side $R_2=0.03$, $X_2=0.07\Omega$ find equivalent resistance impedance and   reactance referred to primary& secondary.   (5)

(b)   A circular iron ring having cross sectional area of $10cm^2$ and length of 4π cm in iron, has an air gap of 0.4πmm made by saw cut. The relative permeability of iron is 10^3 and for free space is $4\pi*10^{-7}$ H/m. The ring is wound with a coil of 2000turns and caries 2mA current. Determine the air gap flux neglecting leakage and fringing.   (5)
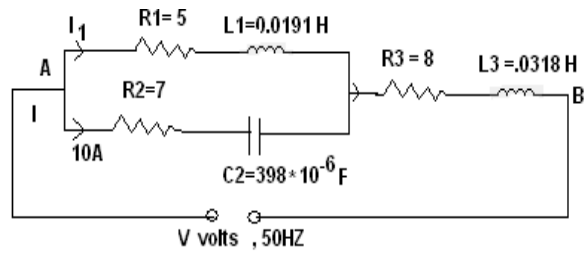
Fig 3

Q5 (a) In the circuit given in Fig 3 determine the value of 50 Hz supply voltage that must be applied across AB in order that a current of 10A may flow through the condenser. All resistances are in ohms. (5)

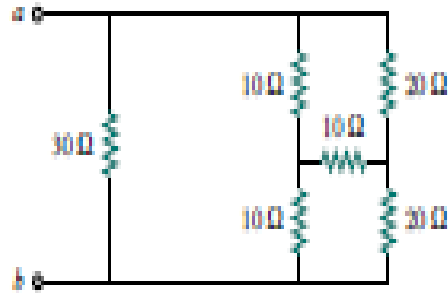**(b)** Obtain the equivalent resistance at the terminals a-b for circuit in Fig 4. (5)

Fig 4

Name of Examination: B.Tech, Mid Semester Theory Examination, February-2022
Branch/Class   : First Year, Section: H   Semester : Ist
Course Name   : Basic Electrical Engineering   Course Code   EE: 101
Time: 90 Min.   Maximum Marks: 30

Note: All questions are Compulsory. Assume suitable value for any missing data.

Question 1. (a) Determine the mesh currents using mesh analysis for the circuit shown in Fig. 1. **(5)**
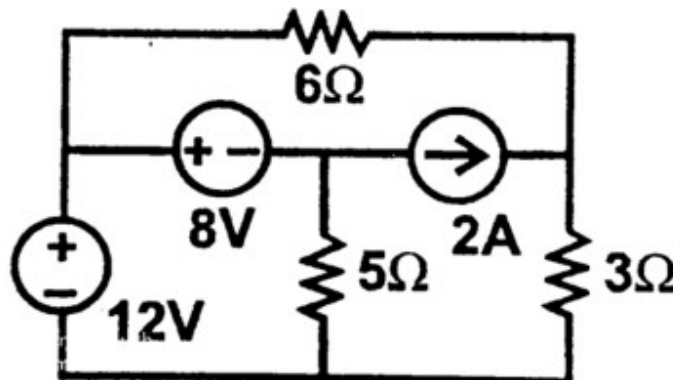

Fig. 1.

(b) In the given network (Fig. 2), if R_L=12 Ω then determine the current through R_L using Thevenin theorem.   **(5)**
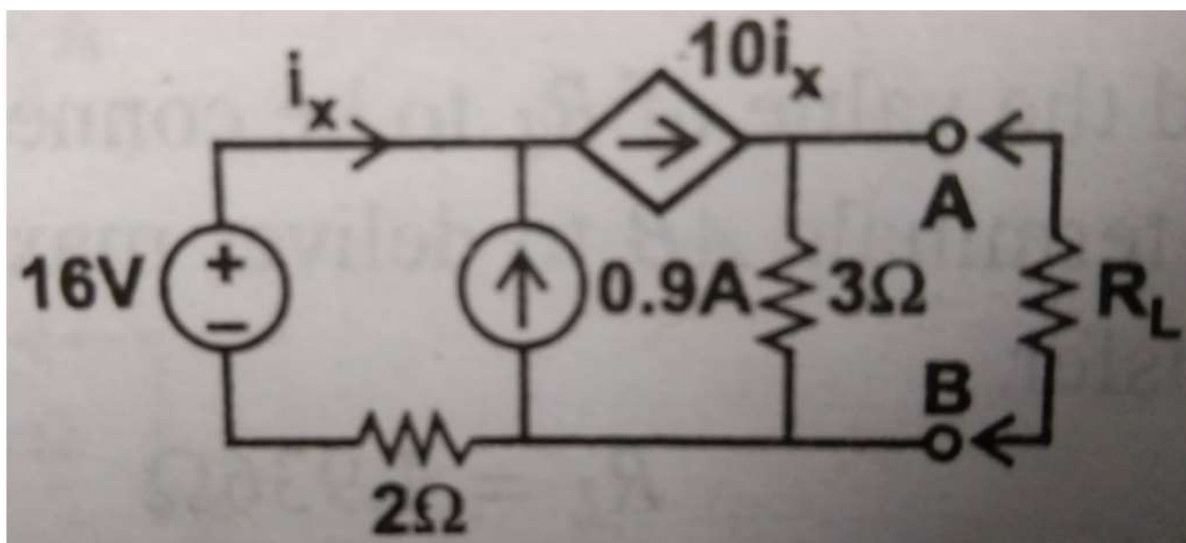

Fig. 2

Question 2: (a) A coil having a resistance of 9 Ω and an inductance of 0.02 H is connected in parallel with a condenser having a capacitance of 350 μF and resistance of 4 Ω. If 110 V 50Hz voltage is applied across the terminal of the above parallel circuit, calculate (i) total current taken from the supply and (ii) its phase angle with respect to supply voltage. Also, Draw the Phasor Diagram.   **(7)**

(b) A balanced three-phase star-connected load of impedance (6 + j8) Ω per phase is connected across a three phase 380 V, 50 Hz supply. Find the line current, power factor, active and reactive power. **(3)**

Question 3: (a) Draw and explain the BH curve.   **(3+3=6)**
An iron ring of 500 cm mean circumference is made from round iron of cross section 25 cm². Its permeability is 550. If it is wound with 500 turns, what current would be required to produce a flux of 0.002Wb?
(b) Draw and explain the equivalent circuit of a transformer and draw the phasor diagram for lagging power factor of a transformer.   **(6)**

Question 4. (a) Describe with the aid of a carefully labelled diagram principle, construction and working of *Dynamometer type wattmeter*. Also discuss the various errors in the same.   **(6)**
(b) The resistance of a moving coil voltmeter is 12 kΩ. The moving coil has 100 turns and is 4 cm long and 3 cm wide. The flux density in the air gap is 0.06 Wb/m². Find the deflection produced by 300 V if the spring control gives a deflection of one degree for a torque of 25x10⁻⁷ Nm.   **(4)**

Question 5: (a) Discuss the importance of back EMF in the DC motor.   **(3)**
(b) Differentiate between the construction and working of induction and synchronous machine.   **(5)**