Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: BASIC ELECTRICAL TECHNOLOGY [ELE 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours 07 MAY 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Use of programmable calculator is not permitted.

1A. For the circuit shown in Fig. 1A, determine the power supplied to the resistive network.

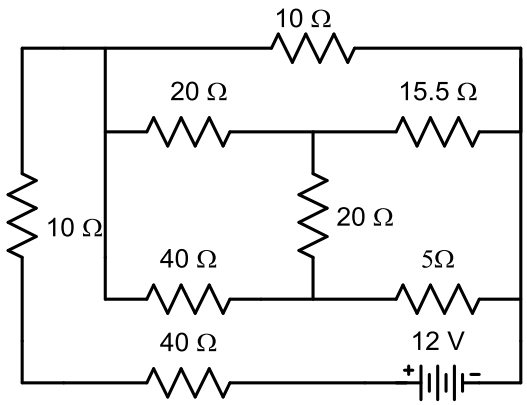

Fig. 1A ***(04)***

1B. In the circuit shown in Fig. 1B, find the current though the 300 Ω resistor using node voltage analysis. Also find the voltage between the points P & Q.

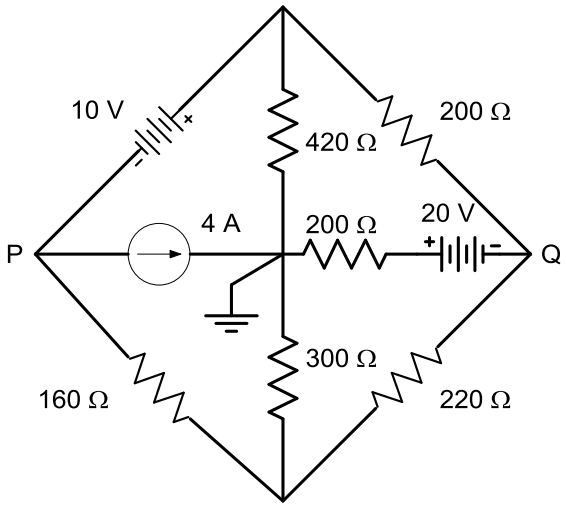

Fig. 1B ***(06)***

2A. A coil of resistance 20 Ω and an inductance of 0.5 H is switched to a 200 V DC supply. Calculate the rate of change of current at (a) the instant of closing the switch, t = 0; (b) at time, t = 2τ. Also sketch the current transient. ***(03)***

2B A magnetic circuit made of silicon steel is as shown in Fig.2B. The central limb has a cross sectional area of 900 mm^2 and a coil of 700 turns. Each of the side limbs has an area of 600 mm^2. Calculate the magnetizing current required to produce a flux of 2 mWb in the 1 mm air gap if μ_r =1000, length *BG* = 150 mm; length BAJIHG = length BCDEFG = 250 mm. Neglect leakage factor.

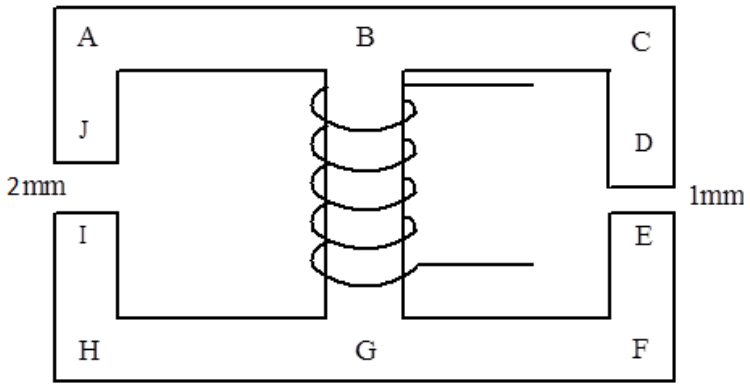

Fig.2B ***(07)***

3A Two impedances, $Z_1 = (12 + j15)\,\Omega$ and $Z_2 = (8 - j4)\,\Omega$ are connected in parallel. If the potential difference across this combination is $(230 + j0)V$; Calculate:

a. Current supplied to each branch and the total current
b. Power consumed by each branch and the total power
c. Overall power factor ***(04)***

3B An inductive coil is connected in series with a resistance of 50 Ω across a 230 V, 50 Hz supply. The voltage across the coil is 180 V; and across the resistance is 130 V. Calculate:

a. The resistance and inductance of the coil
b. The power dissipated in the coil ***(03)***

3C A 125 V ac source supplies a series circuit consisting of a $20.5\,\mu F$ and a coil whose resistance and inductance are $1.06\,\Omega$ and $25.4\,mH$ respectively. The source frequency is adjusted so as to bring the circuit to resonance. Determine:

a. The source frequency and source current
b. The voltages across the capacitor and the coil ***(03)***

4A An unbalanced, star connected load is supplied from a symmetrical, three phase, 440 V supply. The branch impedances of the load are $Z_R = 4\angle 30°\,\Omega$, $Z_Y = 15\angle 45°\,\Omega$, and $Z_B = 10\angle 70°\,\Omega$. Phase sequence is RYB. Obtain the active power consumed by the load. ***(06)***

4B A delta connected load with impedances $Z_{RY} = Z_{YB} = Z_{BR} = 8 + j6\,\Omega$, is connected to 440 V three phase RYB supply. Find the phase and line currents and sketch the phasor diagram. ***(04)***

5A The input power to a three phase balanced load is measured by two wattmeter's both of which indicate 12 kW and – 4 kW respectively. Line voltage is 400 V. Calculate,

a. Power factor of the load
b. The line current ***(03)***

5B What are the operating voltage levels of generation, transmission and distribution of an electric power system? Explain briefly. ***(04)***

5C How DC motors are classified based on field systems? Sketch their speed torque characteristics. ***(03)***