Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: BASIC ELECTRICAL TECHNOLOGY [ELE 1001]

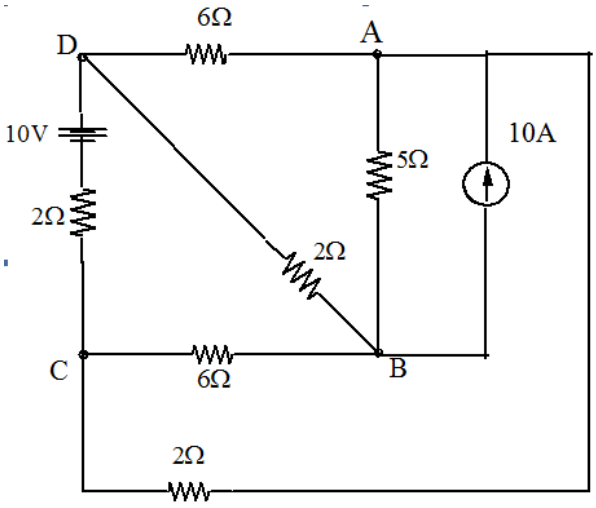
REVISED CREDIT SYSTEM

Time: 3 Hours 30 NOVEMBER 2015 MAX. MARKS: 50

Instructions to Candidates:

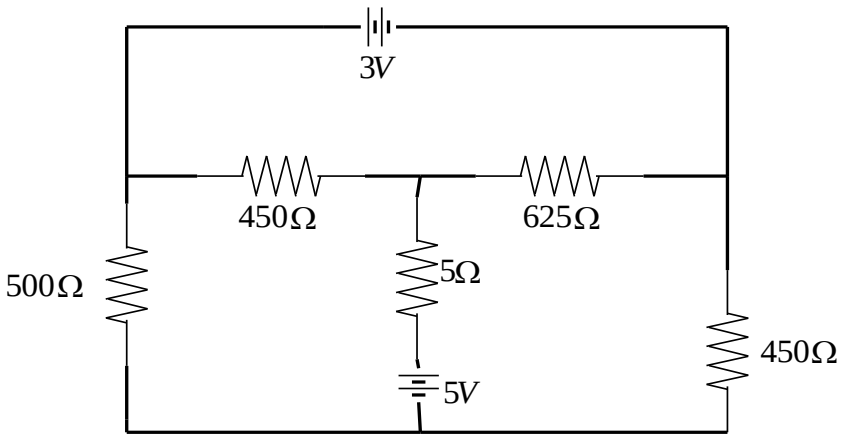
- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Use of programmable calculators are not permitted

1A. In the circuit shown below obtain the mesh current equations and determine the voltage across the nodes A and C and its polarity.



(05)

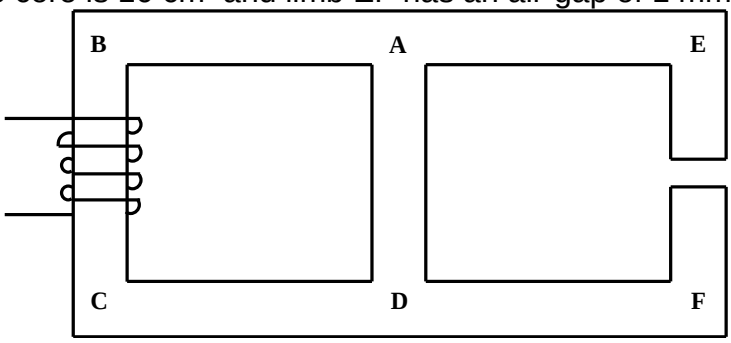
1B. In the circuit shown below, determine the power dissipated in the 625 Ω resistor using node voltage method



(05)

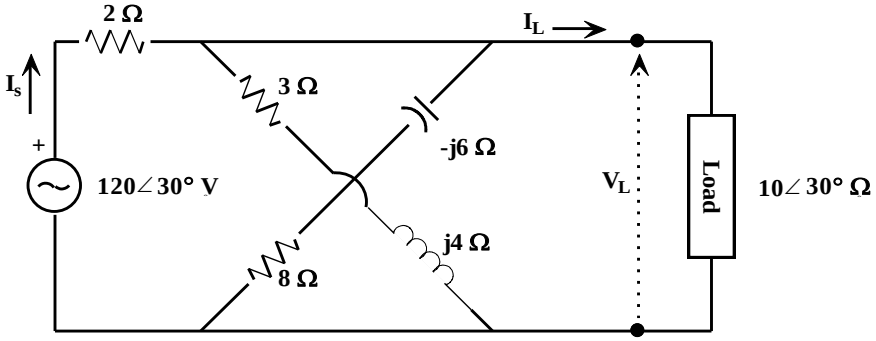
2A. A capacitor of 20 μF is connected in series with a resistor of 10 kΩ across a DC voltage source of 10 V through a switch. Given, the capacitor is initially charged to 3 V with a polarity opposing the source voltage. Find, (a) the rate at which the capacitor voltage changes at the instant of switching, (b) time taken for the capacitor to charge to 7.5 V, and (c) current flowing through the circuit when the voltage across the capacitor is 7.5 V. **(04)**

2B. The magnetic circuit shown below has core with relative permeability 900. Find the current required for the exciting coil to produce a flux of 2 mWb in the central limb. Total number of turns of the coil is 600. Length of flux path ABCD = AEFD = 75 cm and length of flux path AD = 20 cm. Area of cross section of the core is 16 cm^2 and limb EF has an air-gap of 1 mm.



(06)

3A. For the circuit shown below, determine the input current (I_s), the load current (I_L) and the load voltage (V_L).



(05)

3B. Two impedances (8 + j6) Ω and (5 - j12) Ω are connected in parallel across a 240 V, 50 Hz supply. Calculate the active power, reactive power and apparent power drawn by the individual loads and sketch the power triangle. Also find the net active power, reactive power and apparent power associated with the total load and the overall power factor. **(05)**

4A. If a coil of resistance 40 Ω and inductance 0.75 H is connected in series with a capacitor which resonates at 60 Hz then find the value of the capacitor. If the circuit is connected to a 25 V, 50 Hz supply, then determine: (a) the current drawn, and (b) the voltage across the coil. **(04)**

4B. A 3 phase, 400 V, ABC-supply feeds an unbalanced three wire, delta-connected load. The load impedances are Z_{AB} = (12 + j5) Ω; Z_{BC} = (6 + j8) Ω and Z_{CA} = (24 – j7) Ω. Find the phase and line currents. Also find the total real power absorbed by the loads. **(06)**

5A. A balanced three-phase, star-connected load of 33.25 kW takes a leading line current of 80 A from 400 V, 50Hz, three phase supply. Determine the circuit parameters of the load per phase. **(04)**

5B. Describe briefly the following sub-systems of a DC motor: (i) Field System, (ii) Armature System, and (iii) Commutator & Brushes. **(03)**

5C. Explain the working principle of a transformer. Describe briefly its role in an Electric Power System. **(03)**