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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

II SEMESTER B.TECH MAKE UP EXAMINATIONS, JUNE 2016

SUBJECT: BASIC ELECTRICAL TECHNOLOGY [ELE 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours

30 JUNE 2016

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Use of programmable calculator is not permitted.
- **1A.** Determine the resistance between the terminals A and B.



(05)

1B. In the network shown below, find the current through 3 ohm resistor using mesh current analysis



(05)

2A. For the circuit shown below, find the node voltages V_A , V_B , V_C



2B. Three magnetically coupled inductors with self-inductances 0.2 H, 0.5 H and 0.3 H are connected as shown in below. Calculate the effective inductance across A and B if coefficient of couplings are $k_{12} = 0.7$; $k_{23} = 0.8$; $k_{13} = 0.5$ Also find the net inductance if the connections of the middle inductor are reversed.



- **3A.** A magnetic circuit is made of a circular ring of mean circumference of 85 cm and area of cross section of 8 cm². A coil of 1000 turns is wound on the ring and carries a current of 2A, find the resulting magnetic flux in the core. If a saw cut of 1 mm is made on the ring, calculate the new excitation current needed to maintain the same flux in the core. Given the relative permeability of the core as 1000. Neglect fringing effect & leakage factor.
- **3B.** In the network shown in fig, the switch is moved to the position A at t = 0; and changed to position B at t = 50 ms. Determine both current expressions & also sketch the current waveform for t = 0 to 100 ms.



(05)

(06)

(04)

(05)

4A For the circuit shown below, find the equivalent impedance, current in both the branches and total power absorbed by the resistive elements.



- **4B** A factory has the following loads connected to the mains supply of 415V, 50Hz:
 - a) 40 kVA at 0.75 pf lagging
 - b) 5 kW at unity pf
 - c) 10 kVA at 0.9 pf leading

Find the capacitance needed to correct the power factor to 0.9 lagging. **(05)**

- **5A** A 3 phase, 400 V, 50 Hz, RYB, supply feeds an unbalanced delta connected load. The branch impedances of the load are $Z_{RY} = (4 + j3) \Omega$; $Z_{YB} = (6 + j8) \Omega$ and $Z_{BR} = (5 + j12) \Omega$. Find the phase currents and the line currents. Also sketch the phasor diagram representing load voltages and currents. (06)
- **5B.** Write a brief note on electrical power system components. **(04)**