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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: BASIC ELECTRICAL TECHNOLOGY [ELE 1001]

REVISED CREDIT SYSTEM

| Time: 3 Hours | Date: | 03 December 2016 | (9 am to 12 Noon) | Max. Marks: 50 |
|---------------|-------|------------------|-------------------|----------------|
| | Date. | | (3 am to 12 Noon | |

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- 1A. In the circuit shown in Fig. 1A, compute the value of V_s needed to deliver a current of $I_s = 0.25$ A.



- rig. IA
- **1B.** Determine the power supplied by the 2 A source in the circuit shown in Fig. 1B using nodal analysis.



Fig. 1B

(05)

2A. In the circuit shown in Fig. 2A, the switch is initially in position 1 for long time. At time t = 0; the switch is moved to position 2. If $R_D = 500\Omega$, find the solution for current i(t) for $t \ge 0$. Also find the voltage across the coil at the instant at which the switch is changed to position 2.



- (04)
- 2B. A cast steel magnetic structure made for a bar of section 2cm*2cm is shown in Fig. 2B. Determine the current that the 500 turn magnetizing coil on the left limb should carry so that the flux of 2mWb is produced in the right limb. Given relative permeability $\mu_r = 600$, lengths $L_{GFED} = L_{GBCD} = 25 \text{ cm}$, $L_{GD} = 15 \text{ cm}$.



Fig. 2B



3A. Obtain the dotted equivalent for the circuit shown in Fig. 3A. Find k such that the circuit is in series resonance at 50Hz. Given $L_1=0.02H \& L_2 = 0.03H$.



(05)

3B. For the single phase AC series circuit shown in Fig. 3B, find the value of R_{L} , L and V_{S} if the frequency of the supply is 50 Hz and the current flowing through the circuit is 5A.



4A. The power consumed in 5 Ω resistor in the circuit shown in Fig. 4A is 405 watt. Find (i) total impedance of the circuit (ii) source voltage V_S (iii) current through the impedance (3 + j 4) Ω (iv) total current drawn from the source





(05)

(05)

(05)

- **4B.** Determine the line currents in a star connected load supplied from a symmetrical 3-phase, 3 wire 400V system using mesh current analysis. The branch impedance of the load are $Z_A = (7 + j4.04)\Omega$, $Z_B = (8.66 + j8.66)\Omega$ and $Z_C = (4.04 + j7)\Omega$. Take the phase sequence as ABC.
- **5A.** A symmetrical RYB, 400V, 50Hz, three phase supply is connected to unbalanced delta connected load. The load impedances are 150 Ω between R & Y, (50– j50) Ω between Y & B, (30+j70) Ω between B & R. Draw the circuit diagram for two wattmeter method for measurement of power and find out the readings of two wattmeters. (06)
- **5B.** Explain the working principle of single phase induction motor. List some of its applications **(04)**