Roll No. ……..

Lingaya's University

B.Tech. 1st Year (Term – II)
Examination – Feb 2011
Electrical Engineering (EL - 101)

[Time: 3 Hours] **[Max. Marks: 100]**

Before answering the question, candidate should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: – Attempt five questions in all. All questions carry equal marks. Question no. 1 is compulsory. Select two questions from Section B and two questions from Section C.

Section – A

Q-1. Part – A

Select the correct answer of the following multiple choice questions. [10x1=10]

(i) To determine the polarity of voltage drop across a resistor, it is necessary to know the
(a) Value of resistance
(b) Direction of current in the resistance
(c) Value of current in the resistance
(d) Value of resistance & direction of current

(ii) The peak value of sine wave is 100. The *rms* value is
(a) 70.7 (b) 50 (c) 35.35 (d) 100

(iii) The internal resistance of a circuit is 16 ohm. For maximum power transfer, the load resistance should be
(a) 4 ohm (b) 6 ohm (c) 16 ohm (d) 20 ohm

(iv) Open circuit test of a transformer provides
(a) Copper loss (b) Core loss
(c) Copper & core loss (d) None of these

(v) Value of slip in an induction motor is
(a) $N-N_s$ (b) N_s-N (c) N_s (d) N

Q-7. (a) A balanced delta connected load of 8 + j6 ohm per phase is connected to a 3-phase 230 V, 50 Hz supply. Find line current, power factor, reactive power and total volt-amperes. [7]

(b) The input to a 3-phase induction motor running on no-load was measured by two wattmeter method. The readings of wattmeter were 1.2 KW and 6 KW, the first reading having been obtained by reversing the current coil connection. Find power input to the motor & power factor. [7]

(c) Explain methods of power factor improvement. [6]

Q-8. (a) A 2 ohm resistance, 0.125 *F* capacitance and 3 H inductance are connected in series across a voltage $v(t) = 12 \sin (2t + 30^0)$. Find impedance, current, power factor and active power. [10]

(b) When voltage $v = 10 \sin (500t - 60^0)$ is applied to a series A.C. circuit, the current is $i = 6 \sin (500t - 10^0)$. Find: (i) power factor (ii) apparent power (iii) active power (iv) reactive power. [10]

(vi) Reluctance in a magnetic circuit is analogous to
(a) Conductance (b) Inductance
(c) Capacitance (d) Resistance

(vii) A moving coil ammeter is used to measure
(a) A.C. & D.C. current (b) Only A.C. current
(c) Only D.C. current (d) None of these

(viii) The maximum value of power factor in A.C. circuit is
(a) 0 (b) 1 (c) Between 0 & 1 (d) -1

(ix) A material for permanent magnet should have
(a) High retentivity (b) High permeability
(c) Low hysteresis loss (d) High hysteresis loss

(x) Core of a transformer is laminated to reduce
(a) Hysteresis loss (b) Eddy current loss
(c) Hysteresis & eddy current loss (d) Copper loss

Part – B

(a) State & explain Norton's theorem. [5]
(b) Derive *emf* equation of a transformer. [5]

Section – B

Q-2. (a) Draw and explain equivalent circuit of a transformer. [6]
(b) Explain principle, construction & working of a transformer. [7]
(c) Explain efficiency of a transformer. Derive the condition for maximum efficiency. [7]

Q-3. (a) Explain the principle of operation of three phase induction motor.
(b) Explain various methods of speed control of D.C. motor. [2x10=20]

Q-4. (a) Explain principle, construction & working of energy meter.
(b) Explain principle, construction & working of moving coil ammeter. [2x10=20]

Section – C

Q-5. (a) A 4700 Ω resistor and 2 micro-farad capacitor are connected in parallel across a 240V, 60 Hertz source. Determine circuit impedance and line current. [10]

(b) Determine Thevenin's equivalent circuit which may be used to represent the given network at the terminal AB (figure – 1) and find the current in branch AB. [10]

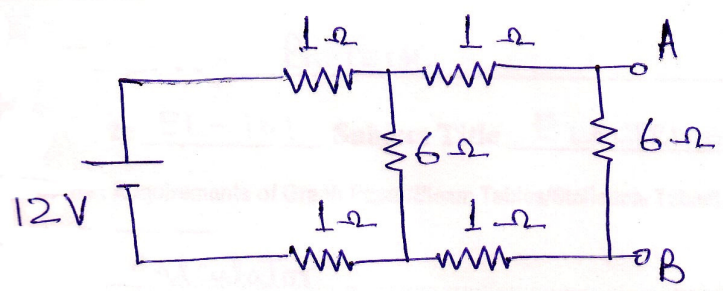

Fig- 1

Q-6. (a) Define following:-
(i) Permeance (ii) Reluctance (iii) Permeability
(iii) Reluctivity (v) Magnetic field intensity [5]

(b) Explain hysteresis phenomenon. [6]

(c) An iron ring is composed of three sections. The cross-sectional area is 0.001 sq. m. for each section. The mean arc length are $L_a = 0.3$ m, $L_b = 0.2$, $L_c = 0.1$ m. An air gap of 0.1 mm is cut in the ring. Relative permeability for section a, b and c are 5000, 1000 and 10000 respectively. Given $\mu_0 = 4\pi \times 10^{-7}$. Find reluctances of sections including air-gap. [9]