Total No. of Questions : 12] **[Total No. of Printed Pages : 4**

[3861]-154

F. E. (Semester - I) Examination - 2010

BASIC ELECTRICAL ENGINEERING

(2008 Pattern)

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

Instructions :

*(1) Answers to the **two sections** should be written in **separate answer-books**.*

(2) Answer Q. No. 1 or Q. No. 2, Q. NO. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10 and Q. No. 11 or Q. No. 12.

(3) Figures to the right indicate full marks.

(4) Neat diagrams must be drawn wherever necessary.

(5) Use of non-programmable pocket size scientific calculator is permitted.

(6) Assume suitable additional data, if necessary.

SECTION - I

Q.1) (A) What is Insulation Resistance ? State its unit and obtain an expression for Insulation Resistance of the Cable. **[08]**

(B) With neat sketch explain Construction and Working of Lead Acid Cell. **[08]**

OR

Q.2) (A) A resistance element having cross-sectional area of 10 mm^2 and length of 10 meter takes a current of 4 Amp from 200V supply at temperature of 25°C. Find (i) resistivity of the material and (ii) current it will take when temperature rises to 75°C. Assume α_{25} = .0003/°C. **[06]**

(B) If α_1 and α_2 are the two resistance temperature coefficients at t_1 °C and t_2 °C, then prove that $(\alpha_1 - \alpha_2) = \alpha_1 \alpha_2 (t_2 - t_1)$. **[06]**

(C) State applications of Nickel-Iron Cell and Nickel-Cadmium Cell. **[04]**

Q.3) (A) State and explain Superposition Theorem as applied to Simple DC Circuit. **[06]**

(B) State and explain Kirchoff's Laws. **[04]**

(C) Determine resistance between (x) and (y) for the circuit shown in fig. 1 : **[06]**

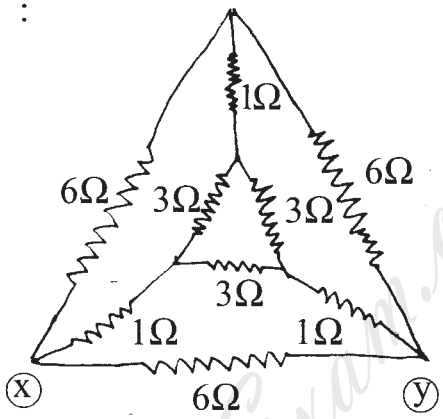

Fig. 1

OR

Q.4) (A) State and explain Maximum Power Transfer Theorem. **[06]**

(B) Apply Thevenin's Theorem to the circuit show in fig. 2 to calculate current in 01Ω resistance : **[10]**

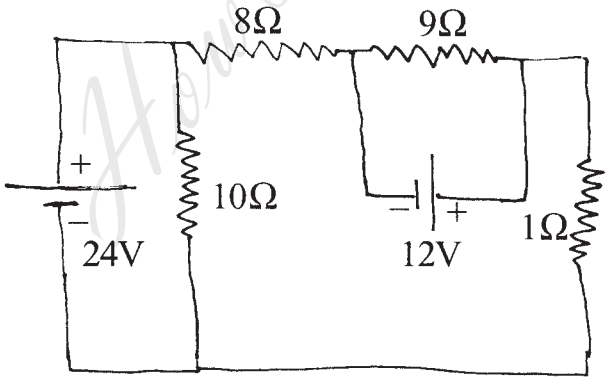

Fig. 2

Q.5) (A) Compare Electric and Magnetic Circuit. **[08]**

(B) Write short notes : **[10]**

(a) Magnetic Leakage and Fringing.

(b) Energy stored in a Magnetic Field.

OR

Q.6) (A) Explain what do you mean by Statically Induced emf and Dynamically Induced emf ? **[06]**

(B) A steel ring of 25 cm mean diameter and of circular cross-section 3 cm diameter has an air gap of 1.5 mm length. It is wound uniformly with 700 turns of wire carrying a current of 2 Amp. Calculate :

(a) MMF

(b) Flux Density

(c) Reluctance and

(d) Relative Permeability of Steel Ring **[12]**

SECTION - II

Q.7) (A) Define w.r.t. alternating quantities : **[09]**

(a) Instantenous Value

(b) Waveform

(c) Cycle

(d) Amplitude

(e) Periodic Time

(f) Frequency

(B) Sketch Waveforms of Currents and find its rms value and average value for the equation : **[08]**

(a) $i_1 = 15 \sin (314.159\ t)$ and

(b) $i_2 = 10 \sin (314.159\ t - \pi/2)$

OR

Q.8) (A) Prove that rms value of the sinusoidal alternating current is 0.707 times its maximum value. **[06]**

(B) Derive expression for energy stored in a capacitor. **[06]**

(C) Two capacitors of 50μF each are connected in parallel with each other and this combination is connected in series with two capacitors of 80μF of 40μF each. Calculate equivalent capacitance of the circuit. **[05]**

Q.9) (A) Define and explain following terms : **[08]**

(a) Active Power

(b) Reactive Power

(c) Impedance

(d) Admittance

(B) A Circuit consisting of Resistance of 20Ω and Inductance of 0.1 Henry is connected in series across single phase 200V, 50 Hz supply. Calculate :

(a) Current Drawn

(b) Power Consumed

(c) Draw relevant Phasor Diagram **[09]**

OR

Q.10) (A) A Coil of Resistance 50Ω and Inductance of 0.1 H is connected in parallel with a branch which consists of resistance of 45Ω in series with a capacitor of 100 μF across a single phase 230V, 50Hz supply. Calculate Current, Power and p.f. of the Circuit. **[09]**

(B) If a sinusoidal voltage of $v = V_m$ sinwt is applied across R-C series circuit, derive expression for current drawn and power consumed. Draw their waveforms also. **[08]**

Q.11) (A) Write short notes : **[08]**

(a) Losses taking place in Transformer

(b) An Autotransformer

(B) Draw a complete phasor diagram for a 3 phase delta connected inductive balanced load supplied for 3-phase symmetrical A.C. supply. State equation for Active Power and Reactive Power consumed by Load. **[08]**

OR

Q.12) (A) A balanced Star Connected Load is supplied by 3-phase, 415V, 50Hz supply. Current in phase is 20 Amp and lags 30° behind its phase voltage. Find :

(a) Power Consumed by Load

(b) Circuit Parameters, and

(c) Load p.f. **[08]**

(B) Explain working principle of transformer and derive expression for emf induced in its winding. **[08]**
