Q4. Attempt any two **(10X2)**

(1) Explain principle of electromechanical energy conversion. Define Back EMF and derive the equation for Back EMF in a DC motor.

A 4 pole lap wound DC generator generates 200 V at 1000 rpm. If this generator is now wave wound and runs at 500 rpm. Then find the generated voltage?

(2) Explain why 3 phase synchronous motor is not self starting. Mention applications of three phase synchronous motor. Also explain the principle of operation of Alternator.

(3) What is the need of starter in a DC motors. Enlist different speed control methods of DC motors and explain any one method for speed control of DC series, DC shunt & DC compound motor.

Q5. Attempt any two **(10X2)**

(1) Why the ceiling fan motor is not self start. Enlist different starting methods of it and explain any one method to make it, self start.

(2) Justify the statement that 3 phase induction motor rotate in the same direction of rotating magnetic field.

A three phase 50 Hz, induction motor has a full-load speed of 1460 rpm. Calculate (i) slip (ii) number of poles (iii) frequency of rotor induced emf. (iv) Rotor magnetic field speed wrt. Stator (v) Rotor magnetic field speed wrt. Stator magnetic field speed.

(3) Explain the principle of operation of Stepper motor and Universal Motor.

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Paper ID & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | | |

B.Tech. (1st Sem.)

UTU, Examination 2013

Basic Electrical Engineering

Time : Three Hours] [Max. Marks : 100

Note: Attempt all questions, the marks assigned to each question is indicated at question itself.

Q1. Attempt any four **(5X4)**

(a) Calculate Thevenin's equivalent circuit of the network in Fig. 1 at terminal AB. Determine the current through 4&! resistor across AB.

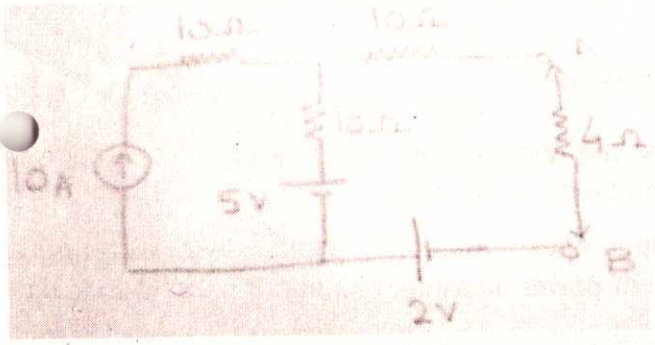

Fig. 1

(b) Explain the resonance in a parallel AC circuit. Also draw the resonance curve for it.

(c) Give the analogy between electric and magnetic circuit.

(d) Derive expressions for converting a delta network into its star equivalent network.

(e) Using nodal analysis, find the current through 10 &! resistor shown in Fig. 2.

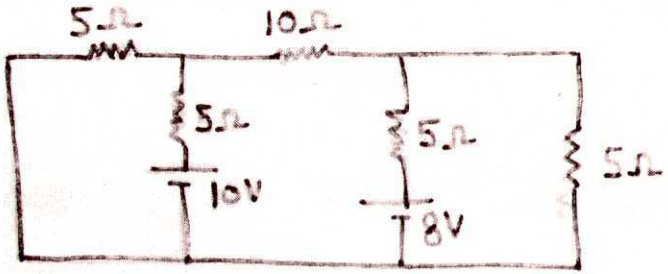

Fig.2

(f) The voltage applied to a circuit is V = 100 sin (wt + 30°) and current flowing in the circuit is i = 20 sin (wt + 60°). Determine the impedance, reactance, resistance, power and power factor of the circuit.

Q2. Attempt any four **(5X4)**

(1) Describe the construction and principle of operation of induction type energy meter.

(2) By proper phasor diagram, explain Two Watt meter method of power measurement in a 3 phase AC circuit.

(3) A balanced delta connected load of (12 + j9) &!/ phase is connected to 3 phase 400 V supply. Calculate the line current, power factor and power drawn by it.

(4) By proper phasor diagram, prove that in a 3 phase star connected system, the line voltage is "3 times of the phase voltage.

(5) Describe the construction and principle of operation of PMMC instruments.

(6) Define (i) 3 phase Balanced and Unbalanced supply system (ii) 3 phase Balanced and Unbalanced load.

Q3. Attempt any two **(10X2)**

(1) Write the principle of operation of a single phase transformer. Also draw and explain its approximate equivalent circuit refers to primary side.

(2) Define voltage regulation in a 1 phase transformer and deduce expression for lagging power factor load.

A 100 kVA single phase transformer, when operating at 0.9 lagging power factor and half load then it has maximum efficiency of 95%. Find the iron and copper losses of transformer at full load and at half load.

(3) Draw the phasor diagram of single phase transformer for a purely resistive load.

The following data were obtained on a 50 kVA, 2400/120 V transformer.

O.C. Test, on LV side: Wattmeter reading: 390W, Ammeter reading: 9 A, Voltmeter reading: 120 V, S.C. Test, on HV side: Wattmeter reading: 800W, Ammeter reading: 20 A, Voltmeter reading: 92 V. Find the equivalent circuit parameters referred to high voltage side?