5. Answer any **two** parts of the following : **(5×2=10)**

(a) Describe the construction details of a single-phase induction-energy motor with neat diagram.

(b) A balanced delta connected load of $(12 + j9)\Omega$/phase is connected to 3-phase 400 V supply. Calculate line current, power factor and power drawn by it.

(c) Shown that in a 3-phase star connected system, the line voltage is $\sqrt{3}$ times of the phase voltage.

6. Answer any **one** part of the following : **(10×1=10)**

(a) Derive an emf expression of power transformer. Also draw an equivalent circuit of it.

(b) Discuss the classification of power system in terms of voltage level. Also draw line diagram of typical substation.

7. Answer any **two** parts of the following : **(5×2=10)**

(a) Discuss the principle of operation of single-phase induction motor.

(b) Explain speed-torque characteristic of dc series motor. Also mention typical application of it.

(c) A dc shunt motor develops an open-circuit emf of 250 volt at 1500 rpm. Find its developed torque for an armature current of 20 amperes.

(Following Paper ID and Roll No. to be filled in your Answer Book)		
PAPER ID : 2301	**Roll No.**	

B. Tech.

(SEM. I) THEORY EXAMINATION 2011-12

ELECTRICAL ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** Sections. Assume any missing data, if any.

SECTION—A

1. Answer all parts with brief explanation : **(2×10=20)**

(a) Write the properties of ideal voltage source.

(b) Write an expression of resonance frequency for high Q-series RLC circuit.

(c) Why two-wattmeter method for power measurement is universal one ?

(d) Explain the term "creep" in energy meter.

(e) Write the abbreviation of ACSR in power system.

(f) What is the concept of grid in power system ?

(g) Classify the losses in power transformer.

(h) Explain the term "slip" in induction motor.

(i) What will happen if the back emf of dc motor vanishes ?

(j) Why dc series motor is preferred in elevators ?

SECTION—B

2. Answer any **three** parts of the following : (10×3=30)

(a) State Norton's Theorem in dc circuit. Also calculate Norton's equivalent of the network shown in fig. 2(a) at terminal AB. Determine the current through 4 Ω resistor across AB.

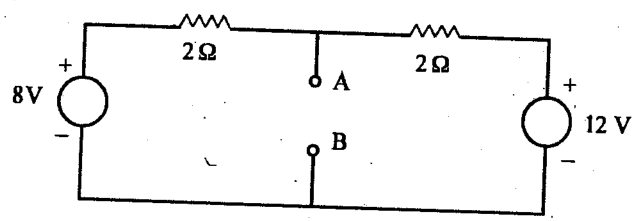

Fig. 2(a)

(b) Show that power in 3-phase, balanced system is constant at every instant and is given by $3\ V_p I_p \cos\phi$, where V_p, I_p and ϕ have usual meanings.

(c) Describe the construction and principle of operating of attraction type moving iron instrument.

(d) Derive the quality factor Q of the series RLC circuit at resonance. Define the bandwidth for the same.

(e) A three-phase 50 Hz, induction motor has a full-load speed of 1460 rpm. Calculate slip, number of poles and frequency of rotor induced emf.

SECTION—C

Note :– Attempt **all** questions in this Section.

3. Answer any **two** parts of the following : (5×2=10)

(a) Explain voltage and current sources of a network with characteristics. Explain source-transformation principle in any circuit.

(b) State and prove maximum power transfer theorem.

(c) Using nodal analysis, find the current through 10 Ω resistor shown in fig. 3(c).

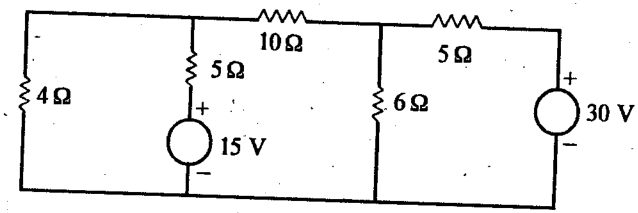

Fig. 3(c)

4. Answer any **one** part of the following : (10×1=10)

(a) The voltage applied to a circuit is $V = 100 \sin(\omega t + 30^\circ)$ and current flowing in the circuit is $i = 20 \sin(\omega t + 60^\circ)$. Determine the impedance, resistance, reactance, power and power factor of the circuit.

(b) Calculate the resonance frequency of the circuit shown in fig. 4(b) :

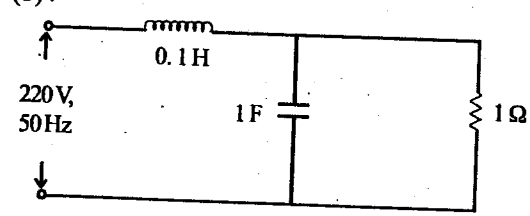

Fig. 4(b)