Level: Bachelor   Semester: Spring   Year   : 2013
Programme: BE   Full Marks: 100
Course: Basic Electrical Engineering   Pass Marks: 45
                                                    Time   : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
*The figures in the margin indicate full marks.*
*Attempt all the questions.*

1. a) Draw a typical single line diagram for the transmission and distribution of three phase power and explain why transformer is needed to transfer power over long distance?   **7**

   b) A resistance wire 10 m long and cross sectional area 10 mm² at 0°c passes a current of 10 A when connected to dc supply of 200 volts. Calculate: **8**

   i. Resistivity of the material
   ii. Current which will flow through the wire when the temperature rises to 50°c. given $\alpha_o=0.0003$ per degree centigrade.

2. a) Use nodal analysis to determine the voltage across BC and the current in the 12-V as shown in figure below.   **8**
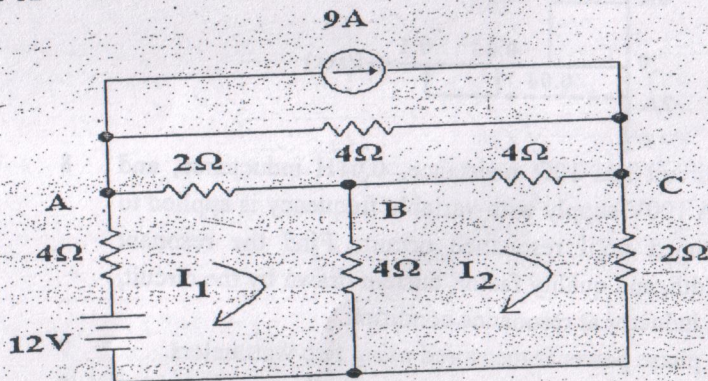

   b) Use superposion theorem to calculate the current through 3Ω of the ckt shown in fig below.   **7**
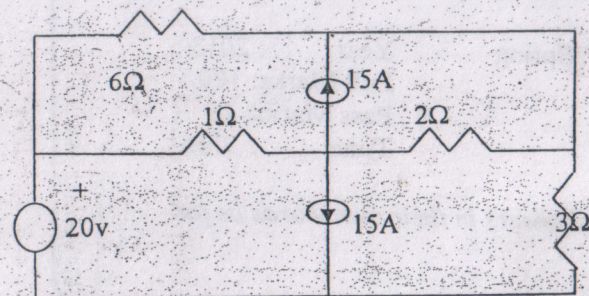
3. a) State and explain Norton's theorem. Find the Norton's equivalent for the network to the left of terminals X-Y in the figure shown below.   7
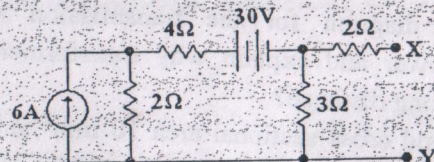
b) A varying current with a periodic waveform as shown in figure below flows through an 8Ω resistor. Determine the   8
   i.   average value
   ii. rms value
   iii. heat dissipated in 5 minute.
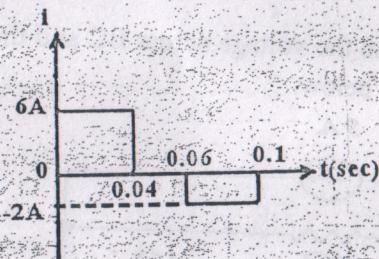
4. a) A series R-L-C circuit has 10Ω resistance, 0.01H inductance, and 100μF capacitor. A 100V supply with variable frequency is applied to this circuit and tuned until resonance occurs. Find the resonant frequency, bandwidth, and quality factor, current drawn by the circuit, and voltage across inductor at resonance condition.   8

b) Explain how three phase power is measured using two wattmeters.   7

5. a) Three equal impedances having resistance 8 Ω and inductive resistance 6 Ω are connected in delta and connected to 230V, 3 phase   8

wire 3øY (wye connected) source. Then calculate
   i.   Phase and line current of load
   ii. Power factor
   iii. Power consumed

b) A 25KVA, 400/200V, 1ø transformer has high voltage winding resistance and reactance are 0.2Ω and 0.5Ω respectively. The values of low voltage are 0.6Ω and 0.8Ω respectively. Calculate the equivalent resistance, reactance and impendence referred to   7
   i.   LV side
   ii. HV side.

6. a) Explain operating principle of 3ø Induction motor.   8

b) A 220v dc shunt motor runs with 1000 rpm with an armature current of 40A. The resistance of armature is 0.5Ω. Calculate the value of resistance to be connected in series so that the speed drops to 600rpm.   7

7. Write short notes on: (Any Two)   2×5
   a) Ideal and practical sources.
   b) Power factor and its significance.
   c) Losses in rotating machines.