(3 Hours) [Total Marks : 100]

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from Question Nos. **2** to **7**.
(3) Assume **suitable** data wherever **necessary**.

1. (a) Define R.M.S. value of an AC quantity. 2
   (b) Explain the effect of temperature on resistance. 3
   (c) Find R_{AB} 3
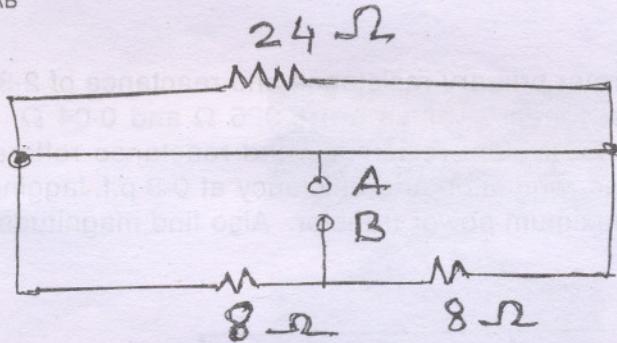
   (d) What is the concept of phasor in AC circuits ? 3
   (e) State the characteristics of an Ideal Transformer. 3
   (f) Derive the expression for quality factor in series resonating circuit. 3
   (g) Why single phase Induction Motors are not self starting ? 3

2. (a) Find current through 1 Ω by Node Analysis and verify the same by Thevenins theorem. 12
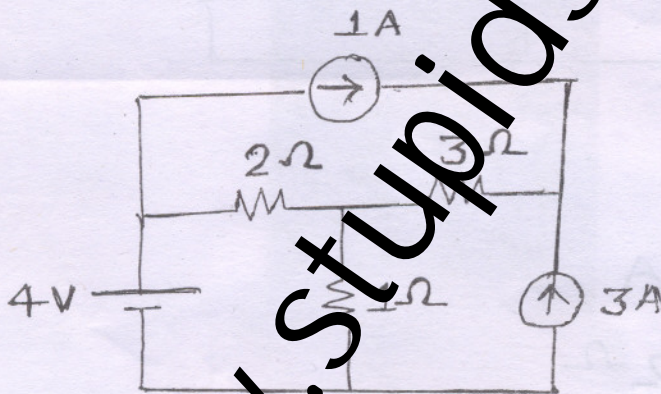

   (b) Explain the construction and working of single phase transformer. 8

3. (a) An alternating current i is given by i = 141·4 sin 314 t. Find (i) The peak value (ii) The frequency (iii) The time period, and (iv) The instantaneous value when time is 3 m sec. 4
   (b) Find r.m.s. and average value of the following waveform. 6
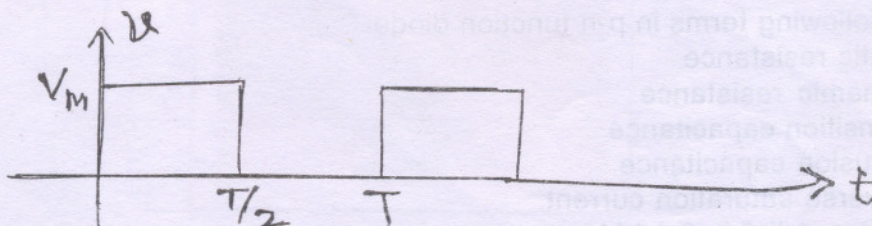
   (c) Show that only Two Wattmeters are sufficient to measure 3 φ power. Also state the advantages of Two Wattmeter Method. 10

4. (a) Prove that for 3 φ, balanced, delta connected load line current is $\sqrt{3}$ times phase current. Also define power triangle in 3 φ circuits. 10

(b) Find the applied voltage V_{Ab} so that 10 A current may flow through the capacitor. **10**
Assume frequency of 50 Hz.
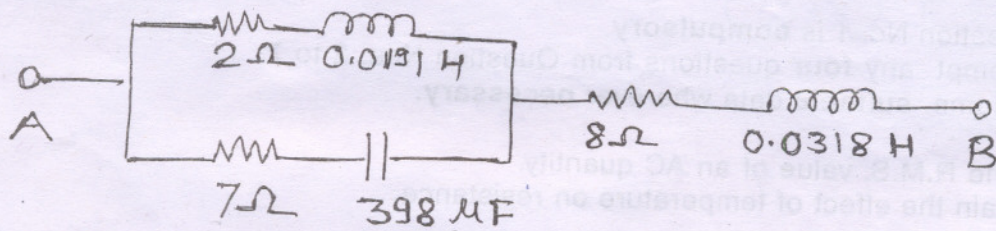
5. (a) A 20 KVA, 2000/200 V, transformer primary resistance and reactance of 2·3 Ω and 4·2 Ω **8**
respectively. Corresponding secondary values are 0·025 Ω and 0·04 Ω. Open-circuit
loss is 200 W. Determine (i) Equivalent resistance and reactance reffered to primary
and secondary and (ii) Full load regulation and efficiency at 0·8 p.f. lagging.

(b) Determine the value of R for maximum power transfer. Also find magnitude of maximum **10**
power transferred.
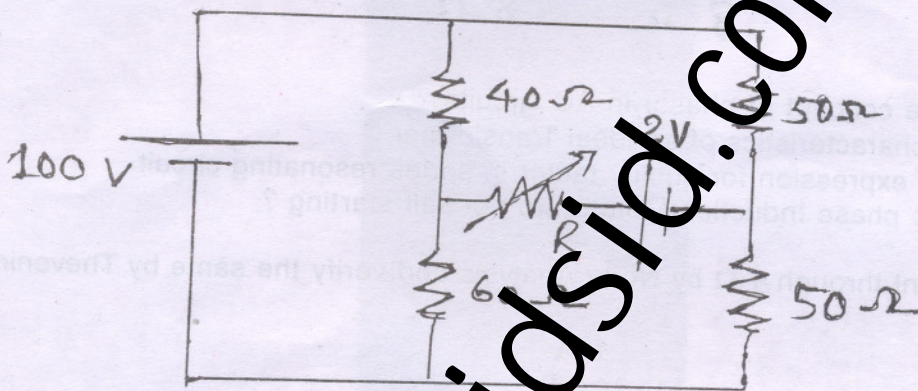
(c) Find Equivalent Delta. **2**
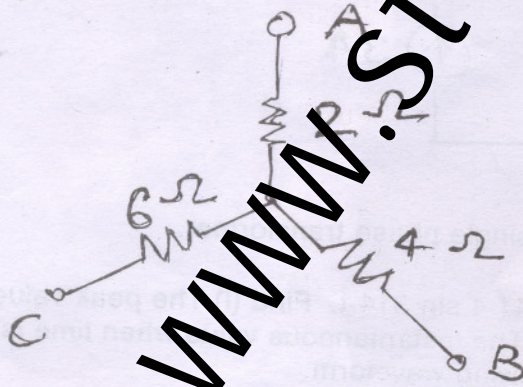
6. (a) Explain the following terms in p-n function diode. **10**
   (i) Static resistance
   (ii) Dynamic resistance
   (iii) Transition capacitance
   (iv) Diffusion capacitance
   (v) Reverse saturation current.

(b) Explain the term "slip" in 3 φ I.M. **3**

(c) Explain Bridge rectifier circuit. **7**

7. (a) For Half Wave Rectifier circuit, derive the expression for r.m.s. value of load current, output **10**
voltage, rectification efficiency and ripple factor.

(b) Derive the emf equation of D.C. machine. Also state the significance of back emf. **8**

(c) What is Filter ? **2**