

**POKHARA UNIVERSITY**

Level: Bachelor  
 Programme: BE

Semester – Spring

Year : 2010

Full Marks : 100

Pass Mark : 45

Course: Electric Circuit and Machines

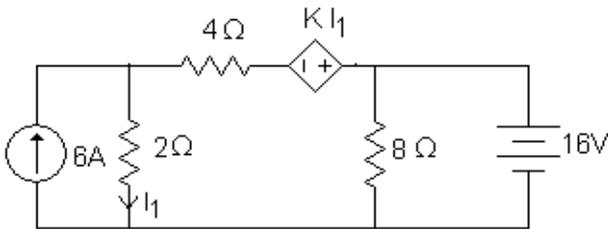
Time : 3 hrs

*Candidates are required to give their answers in their own words as far as practicable.*

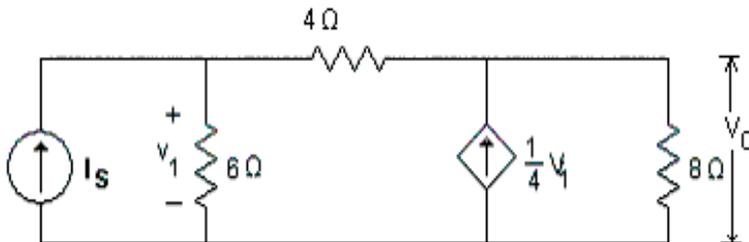
*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a. Find K in the circuit shown below, such that the power dissipated in the  $2\Omega$  resistor is 50W. 7



- b. Applying Kirchhoff's current law, determine the current  $I_s$  in the electric circuit shown below. Take  $V_o$  as 16 V. 8



2. a. Compare series and parallel resonant circuits with respect to i) current ii) impedance iii) power factor iv) resonant frequency. 7
- b. Two circuits A and B are connected in parallel across 200V, 50Hz mains. Circuit A consists of resistance of  $10\Omega$  and an inductance of 0.12H connected in series. Circuit B consists of a 8

resistance  $20\Omega$  in series with a capacitor of  $40\mu\text{F}$ . Calculate the current in each branch. (ii) Source current (iii) Total impedance (iv) Power factor of the whole circuit. Draw phasor diagram.

3. a. Explain the concept of single phase AC EMF generation ? 7  
b. Calculate the average value and rms value of sinusoidal waveform. 8
4. a. Explain the lead acid battery with neat sketches. 7  
b. A balanced star connected load of  $(8 + j6)\ \Omega$  per phase is connected to a 3 phase 230V supply. Find the line currents, power factor, volt amperes, and reactive power. Draw the phasor diagram showing line voltage, phase voltage and phase current. 8
5. a. Explain the working principle of an ideal transformer, when the secondary winding delivers load currents. 7  
b. A 15 KVA, 2200/200 V, 50 Hz transformer gave the following test results: 8
- |                  |      |        |       |
|------------------|------|--------|-------|
| O.C.( LV side):  | 220V | 2.72 A | 185 W |
| S.C. ( HV side): | 112V | 6.3 A  | 197 W |
- Find:
- Voltage regulation
  - Efficiency at full-load
  - Equivalent circuit parameter
6. a. What is armature reaction effect in dc machine? How these effects are neutralized? 7  
b. A 200V shunt motor has an armature resistance of  $0.4\Omega$  and field resistance of  $200\Omega$ . The motor runs 750 rpm and takes an armature current of 25A. Assuming that the load torque remains constant, find the reduction on field resistance necessary to reduce the speed to 500 rpm. Neglect Saturation. 8
7. Write short notes on **any two**: 2×5
- Source transformation
  - Power Factor

c. Quality Factor