## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
### B.Tech II Year I Semester Examinations, February/March-2016
### BASIC ELECTRICAL ENGINEERING
#### (Common to CSE, IT)

Time: 3 Hours                                                                 Max. Marks: 75

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

### PART- A                                                                 (25 Marks)

1.a) Explain the basic circuit components. [2]
  b) Explain Kirchhoff's laws. [3]
  c) What is meant by power factor? [2]
  d) Derive an expression for average power across a capacitor connected to an alternating supply. [3]
  e) Give the constructional details of a 1-$\phi$ transformer. [2]
  f) Define regulation of a Transformer. [3]
  g) What is the condition for maximum efficiency of a d.c machine? [2]
  h) Define slip and slip speed of a 3-$\phi$ Induction motor. [3]
  i) What are the materials with which pointer and scale are manufactured? [2]
  j) What are the advantages and disadvantages of M.I instrument? [3]

### PART-B                                                                 (50 Marks)

2.a) State and explain Thevenin's theorem.
  b) Determine the current I in the network by using Thevenin's theorem (Figure 1).
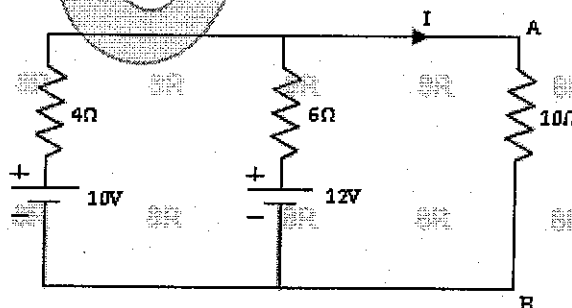                                                                             [4+6]



**Figure: 1**
OR

3.a) State and explain Max. Power transfer theorem.
  b) Calculate the current flowing through $R_L = 20$ of the network shown in the figure 2 by using Thevenin's theorem. [4+6]



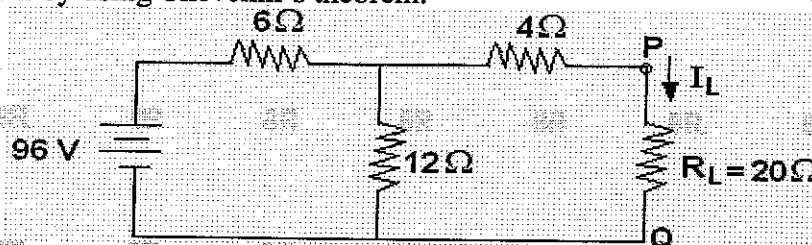**Figure: 2**

4.  A 20 Ω resistance and 30mH inductance are connected in series and the circuit is fed from a 230V, 50Hz, AC supply. Find
    a) Reactance across the inductance, impedance, admittance, current.
    b) Voltage across the resistance.
    c) Voltage across the inductance.
    d) Reactive and Active powers.
    e) Power Factor.                                                        [2+2+2+2+2]

**OR**

5.  Explain the behaviour of AC through:
    a) Pure R
    b) Pure L
    c) Pure C circuits.
    For each case, derive the instantaneous value of V and I, Impedance, Average power, Power factor, Instantaneous power and the relevant phasors.        [3+3+4]

6.a)  With the help of diagram explain the principle of operation of transformer.
  b)  Derive an expression for emf induced in a transformer.        [5+5]

**OR**

7.a)  Determine the efficiency of a 150 KVA transformer at 50% full load and 0.8 power factor lag if the copper loss at full load is 1600 watts and iron loss is 1400 watts.
  b)  Draw the no load and full load phasor diagrams of a transformer.        [5+5]

8.a)  Explain the principle of operation of 3-φ induction machine with neat diagram.
  b)  A 6 pole induction motor is fed form 60 Hz supply. If the frequency of rotor EMF at full load is 2 Hz. Find the full load speed and %slip.        [7+3]

**OR**

9.a)  With neat sketches, explain the construction and functions of the various parts of a d.c. machine.
  b)  A 100V series motor takes 45 A when running at 750 rpm. Its armature resistance is 0.22 ohms, while the series field resistance is 0.13 ohms. Iron and frictional losses amounts to 750 W. Find the shaft power.        [6+4]

10.  Explain the following with reference to the measuring instruments:
    a) Deflecting torque
    b) Controlling torque and
    c) Damping torque.                                                      [3+3+4]

**OR**

11.  Explain with neat sketch the construction and working of a PMMC.        [10]

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