Total No. of printed pages = 6

BASIC ELECTRICAL CIRCUITS

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer any *seven* questions.

1. (a) The elements of 500 Watt electric iron is designed for use on a 200V supply. What value of resistance is required to be connected in series in order that the iron can be operated from 240V supply ?   5

   (b) As shown in figure below, three resistors 4Ω, 12Ω and 6Ω are connected in parallel. If the total current taken is 12A, find the current through each resistor.   5
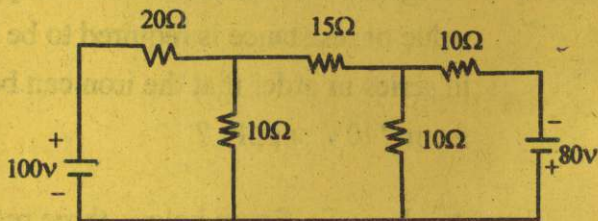
12A   4Ω
       12Ω
       6Ω
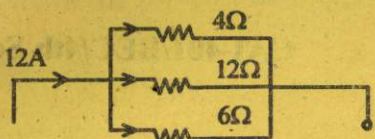
2. (a) Find the magnitude and direction of each branch currents by Mesh current method.   5
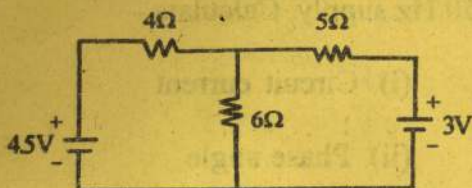

40Ω   60Ω
       20Ω
120V   65V
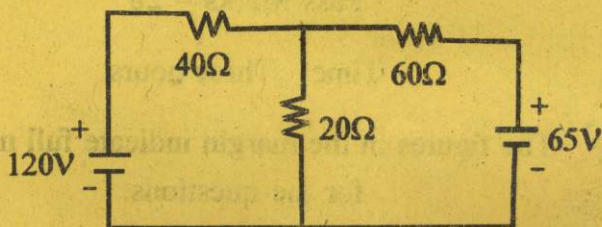
(b) Find the currents in various branches of the circuit by Nodal analysis.   5

20Ω   15Ω   10Ω
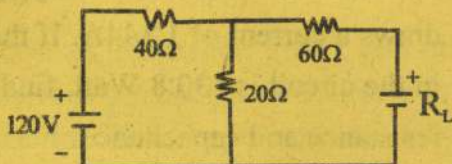   10Ω   10Ω
100v   80v

3. (a) Verify the answer of Question No. 2(b) using superposition theorem.   5

(b) Using Thevenin's theorem, find the current in
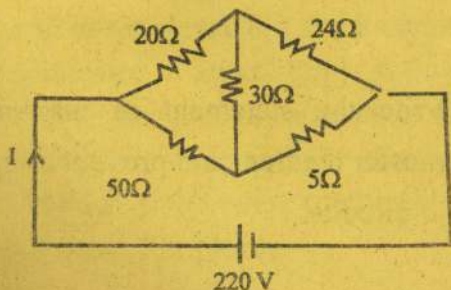6Ω resistance. 　　　　　　　　　　　　　5

4. (a) Verify the answer of the Question No. : 3(b)
using Norton's theorem. 　　　　　　　　5

(b) Calculate the value of load resistance (R_L) to
which maximum power may be transferred
from the circuit. 　　　　　　　　　　5

5. (a) Determine the value of the current delivered
(I) by the source using dalta-star conversion.

6

(b) A coil having a resistance of 7Ω and an inductance of $31\cdot3$ mH are connected to 230V, 50 Hz supply. Calculate –   4

      (i) Circuit current

      (ii) Phase angle

      (iii) Power factor

      (iv) Power consumed.

6. (a) A capacitor and resistor are connected in series across a 120V, 50 Hz supply. The circuit draws a current of $1\cdot144$A. If the power loss in the circuit is $130\cdot8$ Watt, find the value of resistance and capacitance.   5

(b) Apply Millman's theorem to Question No. 3(b) to find the current through 6Ω resistor.

    5

7. (a) Write the statement of maximum power transfer theorem and prove it as applicable to dc circuits.   5

(b) Establish the validity of Reciprocity theorem for the following circuit : 5
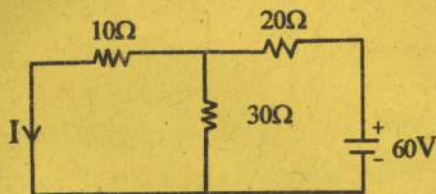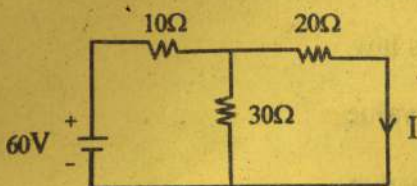
8. (a) A coil of resistance 100Ω and inductance $100\mu H$ is connected in series with a 100pF capacitor. The circuit is connected to a 10V variable frequency supply.

Calculate – (i) the resonant frequency

(ii) current at resonance. 5

(b) A coil of resistance 8Ω and inductance $0\cdot03H$ is connected to an ac supply at 240V, 50 Hz. Calculate the value of capacitance which when connected in series with the above coil causes no change in the value of current and power taken from the supply. 5

9. Write short notes on :　　　　　　　　$2\cdot5\times4=10$

   (i)　Form factor

   (ii)　Ohm's law

   (iii)　RMS value

   (iv)　Resonance.