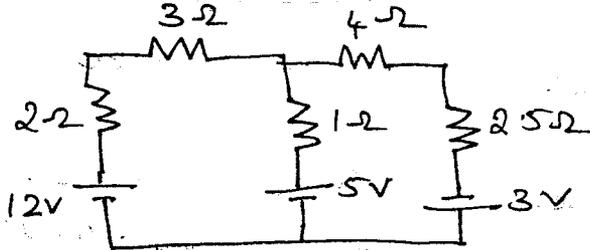# B.Tech Degree I&II Semester Examination in Marine Engineering
June 2012

MRE 107 FUNDAMENTALS OF ENGINEERING I
(B) ELECTRICAL ENGINEERING

Time : 1½ Hours   Maximum Marks : 50

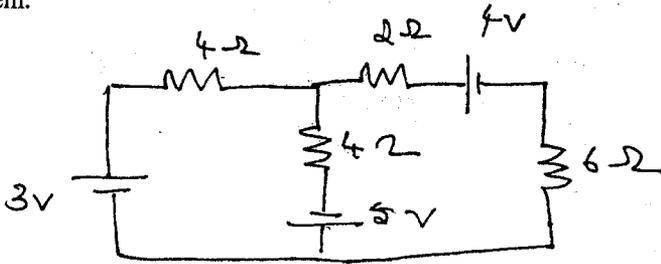I.   (a)   State and explain kirchoff's laws for an electric circuit.   (6)
     (b)   (10)

Using Kirchoff's laws determine

     (i)   current in the 2.5 Ω resistor
     (ii) voltage across 1 Ω resistor, for the circuit shown in figure.
                                 OR

II. (a)   State and explain maximum power transfer theorem.   (6)
     (b)   For the circuit shown in figure, calculate the current in the 6 Ω resistor using Norton's   (10)
           theorem.

III. (a)   State and explain Coloumb's law.   (6)
     (b)   A magnetic core in the form of a closed ring has a mean length of 20cm and a cross section   (12)
           of 1cm². The relative permeability of iron is 2400. What direct current will be needed in a
           coil of 2000 turns uniformly wound the ring to create a flux of 0.2 mwb in the iron.
                                 OR
IV. (a)   State and explain Faraday's law.   (8)
     (b)   Two coils have a mutual inductance of 0.3H. If the current in one coil is varied from 5A to   (10)
           2A in 0.4s, calculate:
           (i)   the average run of induced in the second coil.
           (ii) The change of flux linked with the second coil assuming that it is wound with
                 200 turns

V.   (a)   Define rms value and average value of an alternating current. Obtain the rms value of a   (8)
           sinusoidal quantity.
     (b)   A series circuit consists of a 300 Ω non inductive resistor, a 7.95 μ F capacitor and a 206 H   (8)
           inductor of negligible resistance. If the supply voltage is 250V at 50 Hz, calculate:
           (i) impedance   (ii) circuit current (iii) phase angle (iv) voltage, across each element.
                                 OR
VI. (a)   Define the terms: (8)

           (i) cycle   (ii) frequency (iii) amplitude (iv) time period
     (b)   With the aid of a phasor diagram obtain the relationship between the line and phase values of   (8)
           voltage in a three phase star connected system.

***