Attempt all Questions.   **Max Marks 30**

**Assume the missing data.**   **Max Time 90min**

Q1. Answer the following Questions briefly: **(3X4=12)**

a) A practical voltage source whose short-circuit current is 1.0A and open circuit voltage is 24 Volts. What is the voltage across, and the value of power dissipated in the load resistance when this source is delivering current 0.25A?

b) Find the value of the current I flowing through the battery in the circuit given below, using 'Node voltage' method.
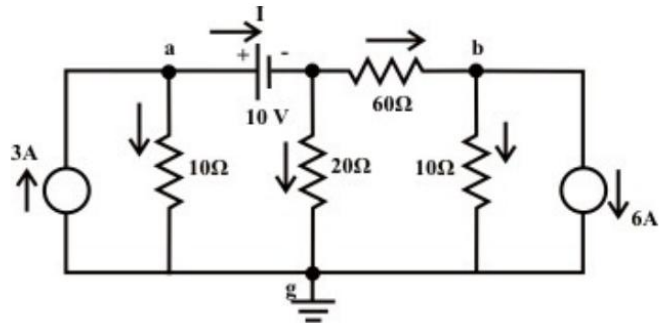
c) In series RL circuit, R = 10 ohms, X = j30 ohms nd the voltage of v(t) = 50 sin(ωt + 30˚) is applied. Draw (i) phasor diagram and (ii) power triangle.

d) When the frequency of applied voltage in series RL circuit is increased, what happens to the inductive reactance. Explain in brief.

Q2. (a) A series circuit consists of two pure elements, which has the following current and voltage:

$$v = 100 \sin(2000t + 50˚) \text{ V}$$
$$i = 20 \cos(2000t + 20˚) \text{ A}$$

Find the elements in the circuit.

(b) Find the average and effective values of the saw tooth wave form for the time period, T.   **(3+2)**

Q3. (a) A dc circuit has voltage V, a current source I, and several resistors. A particular resistor R dissipates a power of 4W when V alone is active. The same resistor dissipates a power of 9W when I alone is active. How much power will be dissipated by R when both sources are active?

(b) Two electrical sub-networks N_1 & N_2 are connected through three resistors as shown in figure. Find the voltage across 15 ohm resistor.
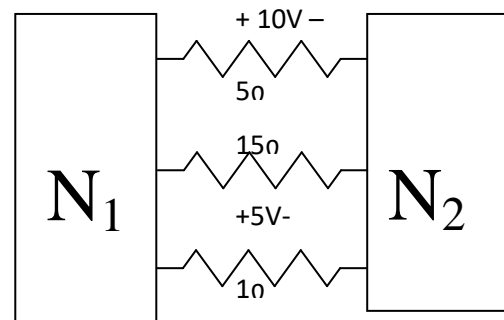
       (3+2)

Q4. Consider a 3 node and 5 branches graph for an electrical network. Draw the graph and explain its properties of circuit theory.   **(4)**

Q5. Suppose V_{in} = 20V in the figure given below, find the output voltage, output current and voltage across each source.   **(4)**