| Exam.		Regular	
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

Subject: - Basic Electrical Engineering *(EE451)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ *Attempt __All__ questions.*
✓ *The figures in the margin indicate __Full Marks__.*
✓ *Assume suitable data if necessary.*

1. a) Differentiate between electro motive force and potential difference. [4]

   b) The current in the field winding of a motor at 20°C is 2A. After running the motor for 6 hours at full load the current falls to 1.75A. If voltage applied across the field winding is 240V, determine the temperature rise of the winding. The temperature coefficient of resistance of the copper winding 0°C is 0.00428/°C. [6]

   c) A d.c circuit comprises two resistors, A of value 25 ohms, and B of unknown value, connected in parallel, together with a third resistor C of value 5 ohms connected in series with the parallel group. The potential difference across C is found to 90V. If the total power in the circuit is 4320 watt. Calculate (a) the value of resistor B, (b) the voltage applied to the ends of the whole circuit, (c) the current in each resistor. [6]

2. a) Use loop current method to calculate the current through the 5Ω resistance for the Network shown below. [6]
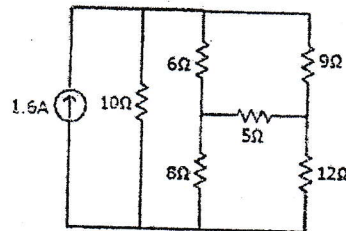
   b) Find the current through 10 Ω resistor using superposition theorem. [6]
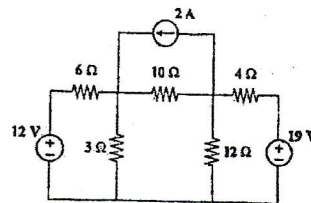
   c) State maximum power transfer theorem and also derive the condition at which maximum power is delivered to the load. [4]

3. a) Determine the value of 'I' shown in figure below, by using Norton's theorem. [6]
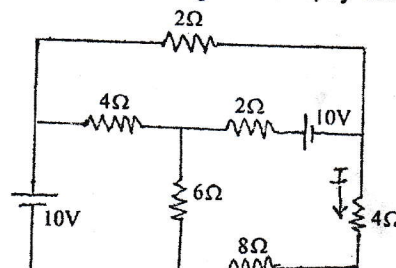

b) Derive the equivalent inductance when two inductors are connected in series aiding connection considering the mutual inductance. [6]

c) A generator produces a voltage wave as a function of time as shown in figure below. The voltage is impressed across 10Ω resistor. How much energy is delivered to resistor in 2 second? [4]
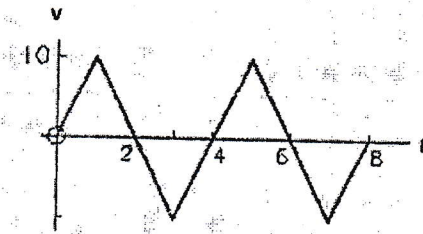

4. a) Three filament bulbs A, B, C when connected separately to $v = 326 \sin(314t)$, takes currents of 5A, 10A and 15A respectively whereas power absorbed by those bulbs are 40 watt, 60 watt and 100 watt respectively. When these three bulbs are connected in series with the same source, calculate (i) total power factor of the circuit (ii) Expression for instantaneous current (iii) power absorbed by this combination [8]

b) For the circuit shown in figure below, calculate (i) overall impedance of circuit. (ii) Total current taken from supply and overall power factor of circuit. (iii) current in each parallel branch (iv) Active, reactive and apparent power. [8]
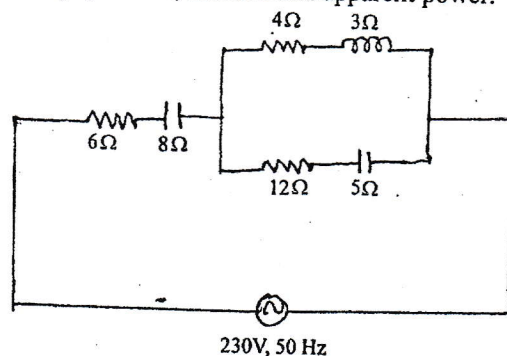
230V, 50 Hz

5. a) For the following unbalanced system with balanced three phase supply of 400 V, 50 Hz, calculate [8]

   i) the line currents and neutral current
   ii) active and reactive power per phase
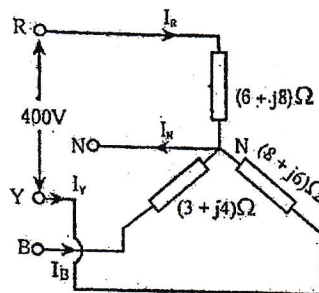
b) How power factor is improved in three phase system. What value of Capacitance must be connected in parallel with a load drawing 1kW at 70% lagging power factor from a 208V, 60Hz Source in order to raise the overall power factor to 91%. [4+4]

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