| Exam.		Regular		
Level	BE	Full Marks	80	
Programme	BEL, BEX, BCT, BAME, BIE, B.Agri.	Pass Marks	32	
Year / Part	I / I	Time	3 hrs.	

Subject: - Basic Electrical Engineering *(EE401)*

✓ 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) A 60 W, 240 V incandescent filament lamp is switched on at 20°C. The operating temperature of the filament is 2000°C. Determine the current taken by the lamp at the instant of switching ON. the temperature coefficient of resistance of the filament material is 0.0045/K. [6]

   b) A battery of unknown emf is connected across resistances, as shown in figure below. The voltage drops across the 8 Ω resistor is 20 V. What will be the current reading in the ammeter? What is the emf of the battery? [5]
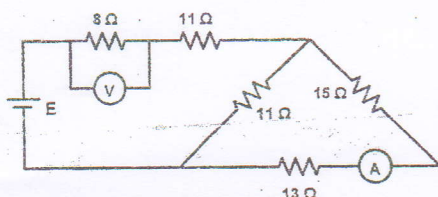
   c) What do you mean by ideal and practical voltage and current sources? [5]

2. a) Find the power dissipation in 15 Ω resistor shown in figure below using mesh analysis. [6]
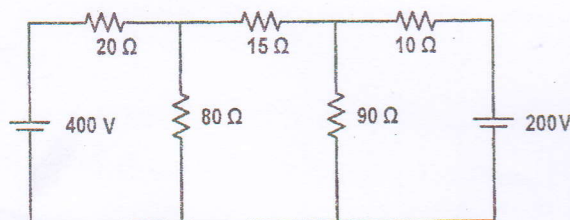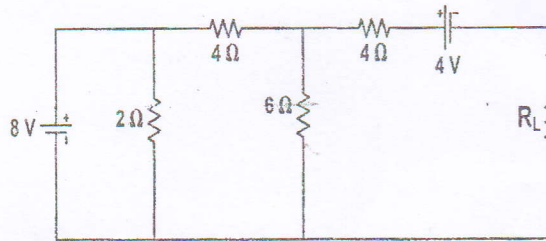

   b) Find current on load resistor R_L, if its resistance is 2 Ω, using superposition theorem. [6]
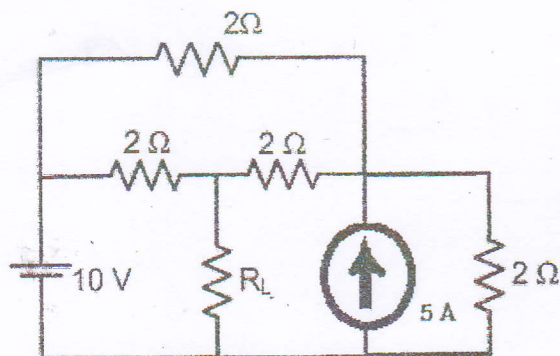
   c) State and explain Norton's theorem with an appropriate example. [4]

3. a) Find the value of R_L for which the maximum power is transferred in the load resistance R_L. Also find the maximum power that can be transferred to the load resistance R_L. [8]
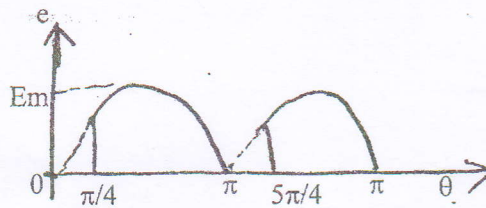

b) Derive the expression for the inductance of inductor in terms of its physical dimensions. [4]

c) Calculate the average and rms value of full-wave rectified sine wave as shown below. [4]

4. a) A circuit consisting of a resistance of 30 Ω in series with an inductance of 75 mH is connected in parallel with a circuit consisting of a resistance of 20 Ω in series with a capacitance of 100 μF. If the parallel combination is connected to a 240 V, 50 Hz single phase supply, calculate (i) The current in each branch (ii) The total current and power factor and (iii) Power consumed. Also draw a neat phasor diagram. [8]

b) For a series path with a resistance of 8 Ω, capacitor of 120μF and an inductance of 0.1 H, a capacitor 180μF is kept in parallel. Then the combination is fed by 240V, 50Hz, 1-φ supply. Calculate branch currents, total current from supply, power factor of whole circuit, active power and reactive power consumed by the circuit. Also show phasor diagram. [8]
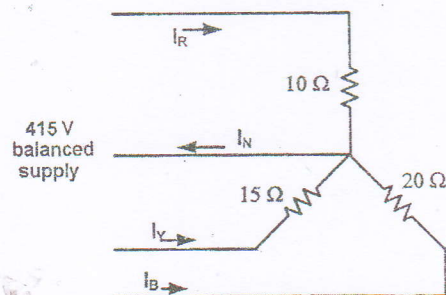
5. a) Develop relation between phase voltage and line voltage in 3-φ star connected system. [4]

b) For the circuit shown in figure below, calculate the current through the neutral and the total power consumed in the load. [8]

c) Explain with connection diagram the measurement of 3-φ power using two wattmeters. [4]

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