Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL,BEX,BCT,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) What do you understand by terms 'resistance' and 'resistivity'? On what factors the resistance offered by a conductor depends? [4]

b) Two resistors made of different materials having temperature coefficients of resistance $\alpha_1 = 0.004/°C$ and $\alpha_2 = 0.005/C°$ are connected in parallel and consume equal power at 15°C. What is the rate of power consumed in resistance R_2 to that in R_1 at 70 c°? [6]

c) Calculate the value of unknown resistance R in the circuit shown below and the current flowing through it when the current in the branch OC is zero. [6]
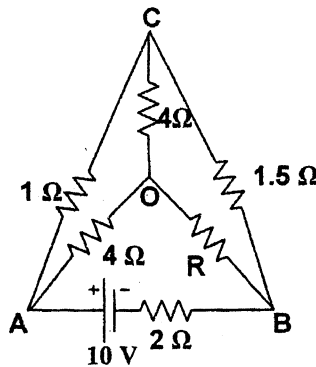
2. a) Calculate the output voltage, V_o for the circuit shown in figure below using Kirchoff's laws. [5]
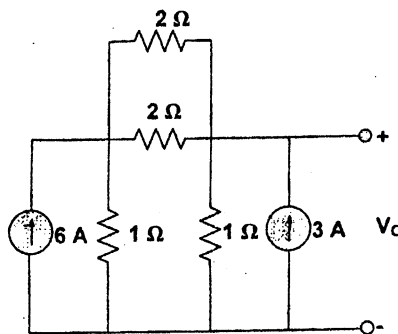
b) Determine the power dissipated by 5Ω resistor in the circuit shown in figure below by applying nodal voltage analysis. [6]
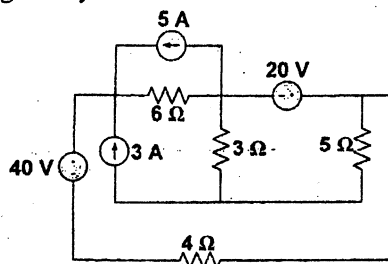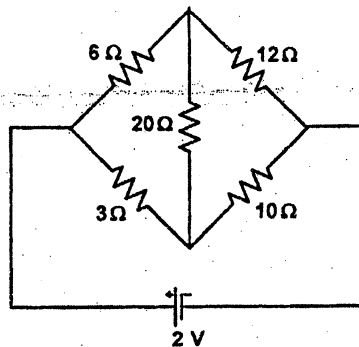

c) State and explain superposition Theorem with an appropriate example. [5]

3. a) For the circuit shown in figure below, what will be the value of R_L to get the maximum power? What is the maximum power delivered to the load? [8]
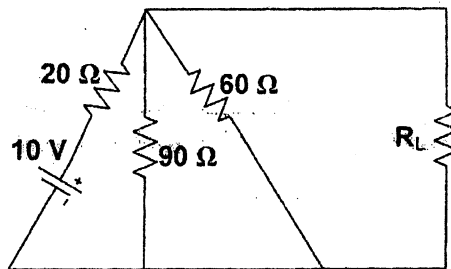
b) Determine the current in 20Ω resistor of the network shown in figure below using Star Delta Transformation [4]

c) State the definition of the capacitance and from it write an equation for the charge stored in a capacitor. [4]

4. a) Derive the equation for instantaneous current flowing through a pure capacitor when excited by AC sinusoidal voltage $V = V_m \sin\omega t$. Draw the waveform of voltage and current and phasor diagram of the circuit. Show analytically and graphically that it does not consume real power. [4]

b) A coil takes 1.3 kVA nd 1.2 kVAR when connected to a 240 V, 50 Hz sinusoidal supply. Calculate: (i) Power dissipated (ii) Current and (c) Inductance of the coil. [4]

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

5. a) What are the two ways of connecting a 3-phase system? Draw their phasor diagrams and write down the relationship between phase and line voltages and phase and line current for these system. [4]

b) A 220 V, 3-phase voltage is applied to a balanced delta connected 3-phase load of phase impedance (15+j20)Ω. Calculate: [8]

    i) The phase voltages
    ii) The phasor current in each line
    iii) The power consumed per phase
    iv) Draw the phasor diagram
    v) What is the phasor sum of three line currents? Why does it have this value?

c) Explain 2-wattmeter method for the measurement of power in a balanced three phase load. [4]

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