RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Faculty of Engineering and Technology			
Department	Electrical engineering	Programme	B.Tech (All branches)
Semester/Batch	1/2017		
Course Code	ESC107A	Course Title	Elements of Electrical Engineering
Course Leader	Mr. S. Nagaraj Rao, Mr. Sachin S. and Mr. Veerabhadra		

Assignment-01			
Reg. No.		Name of Student	

Sections		Marking Scheme	Marks		
			Max Marks	First Examiner Marks	Moderator
Part-A					
	A1.1	Discussion of Norton's and superposition theorems with example	03		
	A1.2	Illustration and conditions of Thevenin's and superposition theorems	03		
	A1.3	Suitability of Norton's/ superposition theorem for power calculation	03		
	A1.4	Conclusion	01		
		Part-A Max Marks	**10**		
Part B.1					
	B1.1	Resistance between terminals A and B	04		
	B1.2	Value of R_x for maximum power	02		
	B1.3	Value of this maximum power	03		
	B1.4	Conclusion	01		
		B.1 Max Marks	**10**		
Part B.2					
	B2.1	Values of all the resistors based on its colour codes	02		
	B2.2	Equivalent electrical circuits	03		
	B2.3	Voltage drop across each resistor	02		
	B2.4	Current flowing through each resistor	02		
	B2.5	Conclusion	01		
		B.2 Max Marks	10		
Part B.3					
	B3.1	Load in kW	03		
	B3.2	Maximum possible current	03		

	B3.3	Daily consumption of energy	03		
	B3.4	Electric charges for the month of September	01		
		B.3 Max Marks	**10**		
Part B.4					
	B4.1	Simulation and graph	03		
	B4.2	Mathematical equation	02		
	B4.3	Conduction of experiment	04		
	B4.4	Comment	01		
		B.4 Max Marks	**10**		
	Total Assignment Marks		**50**		

Course Marks Tabulation				
Component- CET B Assignment	**First Examiner**	**Remarks**	**Second Examiner**	**Remarks**
A				
B.1				
B.2				
B.3				
B.4				
Marks (Max 50)				
Marks (out of 25)				

Signature of First Examiner Signature of Second Examiner

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.

4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment

Instructions to students:

1. The assignment consists of 5 questions: Part A – 1 Question, Part B- 4 Questions.
2. Maximum marks is 50.
3. The assignment has to be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to**20**.
5. Restrict your report for Part-A to 3 pages only.
6. Restrict your report for Part-B to a maximum of 17 pages.
7. The printed assignment must be submitted to the course leader.
8. **Submission Date: 09th October 2017**
9. **Submission after the due date is not permitted.**
10. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Course Preamble

This course deals with basic principles and concepts of Elements of Electrical Engineering. Students are taught the fundamentals of circuit analysis, magnetic circuits, transformers and AC machine operation, fractional-kW motors and DC machines, measuring instruments, wiring and earthing techniques. In addition, wiring methods based on the type of electrical machine used for a given application will be taught using standard software tools.

PART A (10 Marks)

Preamble

A network can be modelled in terms of interconnection of elements, components or devices. The network is written in terms of network variables, these network variables are ‘current through the components’ and ‘voltage across the components’. There are two kinds of components in a network i.e., active and passive. An active device supplies energy to the passive device. The active device is a source and the passive device a load.

The interconnection of sources, resistances and other parameters together in a closed loop is called electrical circuit. Various laws and theorems have been developed to analyze these simple and complex electrical networks.

Debate on the topic "**Norton's theorem is preferred over superposition theorem to solve complex electrical circuits**"

Your debate should address the following:

A1.1 Discuss Norton's and Superposition theorems with an example each

A1.2 Conditions for applying Norton's and Superposition theorem

A1.3 Suitability of Norton's/ superposition theorem for power calculation

A1.4 Justify your stance with conclusion

PART B **(40 Marks)**

B.1 **(10 Marks)**

In a car engine, the power delivered to starter motor of the car will depend on effective resistance of the motor, internal resistance of the battery and resistance 'R_x'. If the resistance values are equal then maximum power will be transferred. Consider a battery of 'X' Volts with an internal resistance of 25 Ω, connected to a network as shown in Figure 1.

Compute:

B1.1 Value of the effective resistance between terminals A and B

B1.2 Value of 'R_x' for transfer of maximum power

B1.3 Value of the maximum power transferred

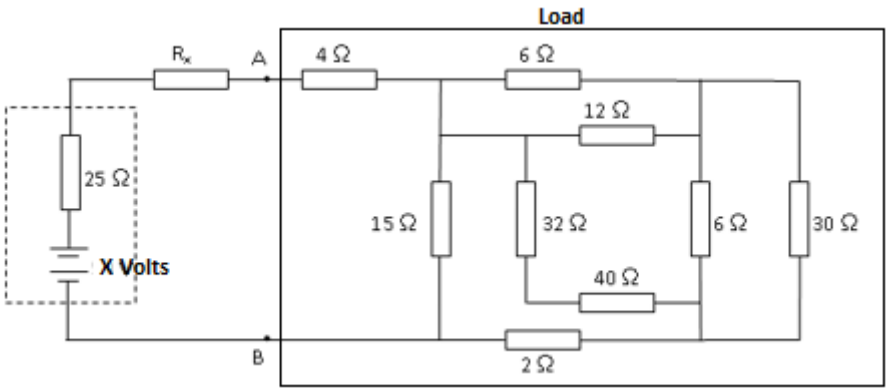

Figure .1

Note: For the value of 'X' contact course leader

B.2 **(10 Marks)**

The colour code of resistors in Figure 2 and Figure 3 are as follows:

R_1 = Brown, Green, Red, Gold

R_2 = Yellow, Violet, Orange, Silver

R_3 = Red, Green, Red, Gold

R_4 = White, Black, Red, Silver

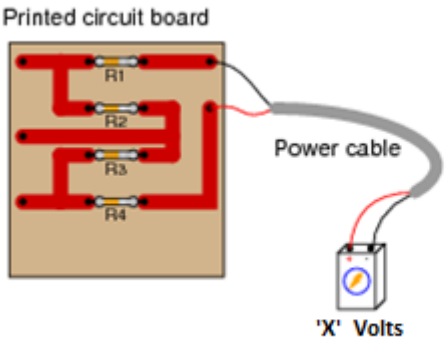

Figure .2

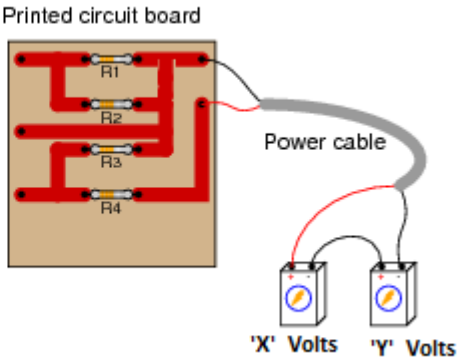

Figure .3

B2.1 Calculate the value of the resistors using colour code.

B2.2 Draw the network configuration for the given circuits shown in figures 2 and 3.

B2.3 Calculate the voltage drop across each resistor for the given circuits shown in figures 2 and 3.

B2.4 Calculate the current flowing through each resistor for the given circuits shown in figures 2 and 3.

Note: For the values of 'X' and 'Y' contact course leader

B.3 **(10 Marks)**

A building has

- 15 LED lamps of 16 W each used for 5 hours a day
- 4 fan points of 75 W each running for 10 hours a day

- Plug point for a 750 W heater used for 1 hour a day
- One TV 100 W used for 6 hours a day
- A 380 W water pump of 80% efficiency running for 2 hours a day

The supply voltage is 230 V and the energy cost is according to your native state electricity board. The rent of energy meter is Rs. 20 per month.

Estimate:

B3.1 Total connected load in kW

B3.2 Maximum current drawn from the supply

B3.3 Daily consumption of energy

B3.4 Electricity bill for the month of September

B.4 **(10 Marks)**

Consider an electrical circuit with voltage source connected in series with a variable resistance 'R' ranging from 1 kΩ to 6 kΩ. Simulate the circuit using any software tool. Vary the voltage source V_{DC} from 0 to 10 V, compute Table 1 and answer the following:

Table 1

V_{DC} (Volts)	I_{DC} (Amps)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

B4.1 Plot 'V_{DC}' vs 'I_{DC}' using Table 1.

B4.2 Analyse the plot of 'V_{DC}' vs 'I_{DC}' and derive the mathematical equation.

B4.3 Verify the simulation results experimentally.

B4.4 Interpret both simulation and experimental results.