Module (Course Syllabus) Catalogue

2023 – 2024

College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering	
Module Name	Electrical Engineering	
Module Code	ELM402	
Degree	Technical Diploma ☐ Bachelor ☑ High Diploma ☐ Master ☐ PhD ☐	
Semester	4th	
Qualification	B.Sc.	
Scientific Title	Engineer	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ☑ Assist. ☐	
Weekly hours	4	
Weekly hours (Theory)	(2) hr Class	(163) Total hrs Workload
Weekly hours (Practical)	(2) hr Class	
Number of Weeks	12	
Lecturer (Theory)	Zana Kanaan Shakir	
E-Mail & Mobile No.	zana.shakir@epu.edu.iq, 07504537351	
Lecturer (Practical)	Zana Kanaan Shakir	
E-Mail & Mobile No.	zana.shakir@epu.edu.iq, 07504537351	
Websites	https://moodle.epu.edu.iq/course/view.php?id=721	

Course Book

<table>
<tr><td>Course Description</td><td colspan="5">This subject will give the principals of the electrical engineering with all the fundamentals of electrical engineering.</td></tr>
<tr><td>Course objectives</td><td colspan="5">▪ Clarify the principals of electrical.
▪ Clarify the main electrical laws.
▪ Clarify how to apply these principals practically.</td></tr>
<tr><td>Student's obligation</td><td colspan="5">Student's obligation in the Electrical Engineering course is:
• Attendance in all lectures.
• One or more quizzes in each chapter.
• Exam in end of course.</td></tr>
<tr><td>Required Learning Materials</td><td colspan="5">• Using data show, white board and PowerPoint, Testing in department’s Laboratory.
• Publish all lecture notes in college web side.</td></tr>
<tr><td rowspan="14">Evaluation</td><td colspan="2">Task</td><td colspan="2">Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td colspan="2">Paper Review</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td rowspan="6">Assignments</td><td>Homework</td><td colspan="2">5</td><td>2, 3, 5, 7</td><td>1, 2, 3, 4, 5</td></tr>
<tr><td>Class Activity</td><td colspan="2">2</td><td>1 – 9</td><td>1, 2, 3, 4, 5</td></tr>
<tr><td>Report</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td>Seminar</td><td colspan="2">5</td><td>8</td><td>1, 2, 3, 4, 5</td></tr>
<tr><td>Essay</td><td colspan="2">X</td><td>X</td><td></td></tr>
<tr><td>Project</td><td colspan="2">5</td><td>7</td><td>1, 2, 3, 4, 5</td></tr>
<tr><td colspan="2">Quiz</td><td colspan="2">8</td><td>5, 6, 7, 8</td><td>1, 2, 3, 4, 5</td></tr>
<tr><td colspan="2">Lab.</td><td colspan="2">10</td><td>2, 3, 4, 5, 6, 7, 8</td><td>1, 2, 3</td></tr>
<tr><td colspan="2" rowspan="2">Midterm Exam</td><td>Theoretical Exam</td><td>Practical Exam</td><td rowspan="2">6 – 9</td><td rowspan="2"></td></tr>
<tr><td>10%</td><td>10%</td></tr>
<tr><td colspan="2" rowspan="2">Final Exam</td><td>Theoretical Exam</td><td>Practical Exam</td><td rowspan="2">16 – 18</td><td rowspan="2"></td></tr>
<tr><td>20%</td><td>20%</td></tr>
<tr><td colspan="2">Total</td><td colspan="2">100%</td><td></td><td></td></tr>
<tr><td>Specific learning outcome:</td><td colspan="5">1. To learn the basic principles of electricity.
2. To learn the basic laws for the analysis of electrical circuits.
3. To learn the essential elements of electrical circuits.
4. Give enough information about the AC and DC.</td></tr>
</table>

	5. Give information about the importance of electricity in the control and operation of electrical machinery that are used in electrical systems.
Course References:	1. Electrical Circuits Fundamentals, by Floyd. 2. Electrical Technology, by B.L.Theraja. 3. Introduction Circuit Analysis, by Robert L. Boylestad. 4. Electrical Science, by K.C. Jain. 5. Electrical Engineering, by Giorgio Rizzoni. 6. Elements of Engineering Electromagnetic, by Rao.

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction to Electrical technology, Basic definitions.	1	1
Electrical Resistors, types, resistivity and conductivity, temperature effect on resistance, conductance, and insulators.	2	2, 3
Ohm's Law, electrical sources and their types.	3	2, 3
Electrical circuit element connection, series, parallel, series – parallel and simplification.	4 – 5	2, 3
Electrical circuit laws, Kerchief's laws, voltage divider rule, current divider rule.	6	2, 3
Delta – Star conversion or transformations.	7	4, 5
Electrical circuits theorem: Maxwell's loop current (Mesh method	8	2, 3, 4
Nodal analysis method, Superposition theorem, Thevenin's and Norton's theorems.	9	2, 3, 4
Magnetism and Electromagnetism.	10	4
AC Fundamentals and basic definitions, periodic function, r.m.s. values. Capacitors and Inductors, Transient circuits RC, RL & RLC.	11	2, 3, 4, 5
Transformer, equivalent circuit, losses, efficiency.	12	1, 4

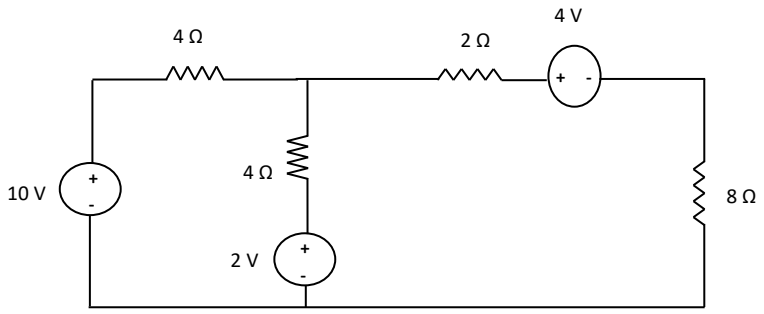
Practical Topics	**Week**	**Learning Outcome**
Measuring Resistance Color code	1	1
Ohm's Law	2	2, 3
Resistances series and parallel connection	3 – 4	2, 3
Kirchhoff's Current and Voltage Laws	5 – 6	2, 3, 4
Superposition's Theorem	7	2, 3

Thevenin's and Norton's Theorems	8 – 9	2, 3
Utilization of cathode-ray oscilloscope	10	4
AC circuit elements	11 – 12	4, 5

19. Examinations:

1. Theory questions:

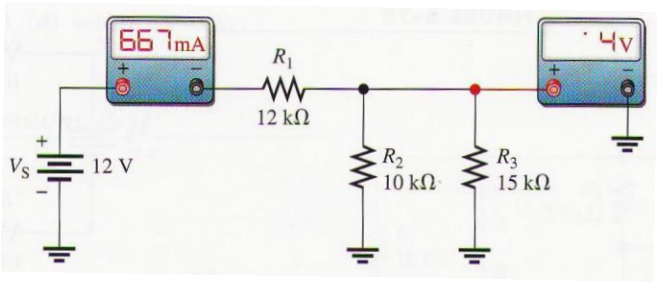
In the circuit shown in Fig. 3, find Norton's equivalent circuit external to the 8Ω resistance, then find the load voltage (voltage across 8Ω resistance).



Using Maxwell's Loop Current Method of the network shown in Fig. 4 to find the currents (i_1 and i_2).

2. Practical questions:

Determine the cause for each set of symptoms. Refer to Figure 4.



1. Symptom: The ammeter reading is 1 mA, and the voltmeter reading is 0 V.

Cause:
(a) There is a short across R_1.
(b) There is a short across R_2.
(c) R_3 is open.

2. Symptom: The ammeter reading is near zero, and the voltmeter reading is 12 V.
   Cause:
   (a) R_1 is open.
   (b) R_2 is open.
   (c) Both R_2 and R_3 are open.

3. Symptom: The ammeter reading is 2 mA, and the voltmeter reading is 12 V.
   Cause:
   (a) R_1 is shorted.
   (b) R_2 is shorted.
   (c) Both R_2 and R_3 are open.

3. Find the resistance values in ohms and the percent tolerance for each of the color-code resistors:
   (a) First band is red, second band is red, third band is orange, fourth band is silver.
   (b) First band is brown, second band is brown, third band is red, fourth band is silver.
   (c) First band is green, second band is blue, third band is red, fourth band is gold.
   (d) First band is brown, second band is red, third band is blue, fourth band is gold.

Extra notes:

External Evaluator

It's excellent and includes all requirements.

Assistant professor
Dr. Hilmi F. Ameen
Electrical Engineering Department
College of Engineering
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