Sana'a University
Faculty of Engineering
Electrical Engineering Department
B.Sc. of Computer and Control Engineering

25. Course Specification of Electronics 1

I. Course Identification and General Information:

1.	Course Title:	Electronics 1				
2.	Course Code & Number:	PME113				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	2	-	4
4.	Study level/ semester at which this course is offered:	Level 2- Semester 2				
5.	Pre –requisite (if any):	Electrical Circuits 1(PME111)				
6.	Co –requisite (if any):	Electrical Circuits 2(PME112)				
7.	Program (s) in which the course is offered:	Electrical Eng. Dept				
8.	Language of teaching the course:	English & Arabic				
9.	Location of teaching the course:	Inside the University, Faculty of Engineering Electrical Engineering Department				
10.	Prepared By:	Asst. Prof. Dr. Abdulkafi Al-Eriany				
11.	Date of Approval	December 2020				

II. Course Description:

This course introduces fundamental principles and concepts of atomic structure, energy bands, semiconductor types and how to form deferent types of electronic devices. The first electronic device to be introduced is the diode, which is the simplest of semiconductor device but it plays a very vital role in electronic systems such as voltage rectifiers, clippers, clampers, voltage multiplier circuits and so on. Furthermore, we will study in details the two main types of transistors (BJTs and FETs) starting with construction, operation, parameters and characteristics,

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modeling, DC and AC analysis of each type with strong emphasis on the Metal Oxide Semiconductor FETs (MOSFETs).

	III. Course Intended learning outcomes (CILOs) of the course	**Referenced PILOs**
a1	Demonstrate knowledge of history and developed characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic materials and devices.	A1
a2	Describe principles and basic concepts of electronic devices, fabrication, characteristics, operations.	A2
b1	Solve electronics systems using appropriate methods and modeling techniques.	B1
b2	Analyze the electronics engineering in the field of industrial products.	B3
c1	Employ the international standards and technical specifications of analog electronics components while designing and integrating electronic systems.	C2
c2	Conduct laboratory experiments safely to verify theoretical concepts related to electronics components and devices.	C3
d1	Assess personal commitment to electronics engineering tasks and effectively manage time and resources.	D3

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

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a1- Demonstrate knowledge and understanding of history of development, characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic materials and devices.	▪ Active lectures ▪ Tutorials ▪ Exercises and Homework	▪ Written tests (Mid and final Terms) ▪ Written assessments such as multiple-choice questions and Quizzes ▪ Short Essays
a2- Describe principles and basic concepts of electronic devices, fabrication, characteristics, operations.	▪ Active lectures ▪ Hands-on Laboratory work ▪ Exercises and Homework	▪ Written tests (Mid and final Terms) ▪ Practical Assessment ▪ Simulation

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Solve electronics systems using appropriate methods and modeling techniques.	▪ Active lectures ▪ Design Work and Project ▪ Case Studies	▪ Written tests (Mid and final Terms) ▪ Practical Assessment ▪ Simulation ▪ Reports
b2- Analyze the electronics engineering in the field of industrial products.	▪ Active lectures ▪ Hands-on Laboratory Work ▪ Case Studies	▪ Written tests (Mid and final Terms) ▪ Written assessments ▪ Project Reports

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

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Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Employ the international standards and technical specifications of analog electronics components while designing and integrating electronic systems.	▪ Active lectures ▪ Hands-on Laboratory Work ▪ Design Work	▪ Written assessments such as multiple-choice questions and Quizzes ▪ Short Essays
c2- Conduct laboratory experiments safely to verify theoretical concepts related to electronics components and devices.	▪ Active lectures ▪ Hands-on Laboratory Work ▪ Case Studies	▪ Practical Assessment ▪ Simulation ▪ Laboratory Reports

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Assess personal commitment to electronics engineering tasks and effectively manage time and resources.	▪ Active lectures ▪ Case Studies	▪ Reports Short Essays. ▪ Presentations

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Solid state principles	a1, a2	▪ Course orientations. ▪ Atomic structure. ▪ Energy bands.	1	2

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2.	Semiconductor	a1, a2	▪ Silicon and Germanium atomic structure. ▪ Intrinsic and extrinsic semiconductor. ▪ Diffusion current. ▪ N-type and P-type semiconductors.	1	2
3.	Diode	a1, a2	▪ Operation and biasing. ▪ Forward biasing of the diode. ▪ Reversed biasing of the diode.	1	2
4.	Diode	a1, a2	▪ Diode V-I Characteristics. ▪ Temperature Effect. ▪ Basic and complicated diode circuits.	1	2
5.	Diode applications	a1, a2	▪ Half- Wave and Full- Wave rectification circuits. ▪ Center tapped transformer. ▪ Clippers. ▪ Clampers.	1	2
6.	Zener diode and LEDS	a1, a2, b1	▪ Zener Characteristics and application. ▪ Voltage regulation. ▪ Light Emitting Diode LED – Construction and operation.	1	2
7.	Bipolar junction transistor (BJT)	a1, a2, b1	▪ Types, construction and configurations. ▪ Operation and biasing.	1	2

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8.	Bipolar junction transistor (BJT)	a1, a2, b1, b2	▪ Load line and Q-Point determination. ▪ BJT as an Electronic Switch.	1	2
9.	Bipolar junction transistor (BJT)	a1, a2, b1, b2, c2, d1	▪ BJT Modeling. ▪ re Model. ▪ Hybrid equivalent model (h-Parameters) ▪ AC analysis. ▪ Voltage amplification.	1	2
10.	Field effect transistors (FETS)	a1, a2, b1, b2, d1	▪ Classification. ▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	1	2
11.	Junction field effect transistor (JFET)	a1, a2, b1, b2, c2, d1	▪ Modeling. ▪ AC analysis.	1	2
12.	Depletion mosfet (D-MOS)	a1, a2, b1, b2, c2, d1	▪ Classification. ▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	1	2
13.	Enhancement mosfet (E-MOS)	a1, a2, b1, b2, c2, d1	▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	1	2

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14.	Overview	a1, a2, b1, b2, c1, c2, d1	▪ All Topics	1	2
Number of Weeks /and Units Per Semester				**14**	**28**

B – Tutorial Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Solid state principles	a1, a2	• Course orientations. • Atomic structure. • Energy bands.	1	2
2.	Semiconductor	a1, a2	• Silicon and Germanium atomic structure. • Intrinsic and extrinsic semiconductor. • Diffusion current. • N-type and P-type semiconductors.	1	2
3.	Diode	a1, a2	• Operation and biasing. • Forward biasing of the diode. • Reversed biasing of the diode.	1	2
4.	Diode	a1, a2	• Diode V-I Characteristics. • Temperature Effect. • Basic and complicated diode circuits.	1	2
5.	Diode applications	a1, a2	• Half- Wave and Full- Wave rectification circuits.	1	2

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			• Center tapped transformer. • Clippers. • Clampers.		
6.	Zener diode and LEDS	a1, a2, b1	• Zener Characteristics and application. • Voltage regulation. • Light Emitting Diode LED – Construction and operation.	1	2
7.	Bipolar junction transistor (BJT)	a1, a2, b1	• Types, construction and configurations. • Operation and biasing.	1	2
8.	Bipolar junction transistor (BJT)	a1, a2, b1, b2	• Load line and Q-Point determination. • BJT as an Electronic Switch.	1	2
9.	Bipolar junction transistor (BJT)	a1, a2, b1, b2, c2, d1	• BJT Modeling. • r_e Model. • Hybrid equivalent model (h-Parameters) • AC analysis. • Voltage amplification.	1	2
10.	Field Effect Transistors (FETS)	a1, a2, b1, b2, d1	• Classification. • Construction. • Operation. • DC analysis. • Output and transfer characteristics.	1	2
11.	Junction field effect transistor (JFET)	a1, a2, b1, b2, c2, d1	• Modeling. • AC analysis.	1	2

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12.	Depletion MOSFET (D-MOS)	a1, a2, b1, b2, c2, d1	• Classification. • Construction. • Operation. • DC analysis. • Output and transfer characteristics.	1	2
13.	Enhancement MOSFET (E-MOS)	a1, a2, b1, b2, c2, d1	• Construction. • Operation. • DC analysis. • Output and transfer characteristics.	1	2
14.	Overview	a1, a2, b1, b2, c1, c2, d1	• All Topics	1	2
Number of Weeks /and Units Per Semester				**14**	**28**

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C – Practical Aspect:				
Order	**Tasks/ Experiments**	**Number of Weeks**	**Contact hours**	**Learning Outcomes**
1.	▪ An Experiment to be familiarize with Measuring Instruments and Tools.	1	2	a1, b1, b2, c2
2.	▪ Errors of measurement. ▪ Types of errors. ▪ Mathematical expression of errors	1	2	a1, b1, b2, c2
3.	▪ Forward biasing of the P-N Junction diode, verification of I-V Characteristics of P-N Junction Diodes.	1	2	b1, b2, c1, c2, d1
4.	▪ Half- Wave and Full-Wave Rectifiers, Center tapped transformer, output waveforms and filtration	1	2	b1, b2, c1, c2, d1
5.	▪ Measurement of Zener Diode Characteristics	1	2	b1, b2, c1, c2, d1
6.	▪ Measurement the output waveform of Clamper circuit	1	2	b1, b2, c1, c2, d1
7.	▪ Determination of the Q-Point of the collector characteristics	1	2	b1, b2, c1, c2, d1
8.	▪ Verification of DC parameters and variables of BJTs and FETs in different configurations	1	2	b1, b2, c1, c2, d1
9.	▪ BJT as an Electronic Switch	1	2	b1, b2, c1, c2, d1
10.	▪ Verification of AC parameters and variables of BJTs and FETs in different configurations	1	2	b1, b2, c1, c2, d1

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11.	▪ Output characteristics of BJT	1	2	b1, b2, c1, c2, d1
12.	▪ Transfer characteristics of FETs	1	2	a1, a2, b1, b2, c1, c2, d1
13.	▪ Project Presentation	1	2	a1, a2, b1, b2, c1, c2, d1
14.	▪ Review	1	2	a1, b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

- Active lectures
- Tutorials
- Projects and Report Presentations
- Laboratory hands-on work
- Design Work
- Case Studies

VI. Assignments:

No	Assignments	Aligned CILOs (symbols)	Week Due	Mark
1.	P-N Junction Diode	a1, a2	2nd & 3rd	2
2.	Half-waves and Full-waves Rectifiers	a1, a2, b1, b2, c2, d1	4th	4
3.	Zener Diode	a1, a2, b1, c2	5th	2
4.	BJT Transistor DC &AC Analysis.	a1, a2, b1, b2, c2, d1	6th to 9th	6
5.	FET Transistors DC & Ac Analysis	a1, a2, b1, b2, c2, d1	10th to 13th	6
Total				**20**

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VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignments& Homework	2nd to 15th	20	10%	a1, a2, b1, b2, c2, d1
2.	Lab work and experiments reports	4th to 13th	20	10%	a1, b1, b2, c1, c2, d1
3.	Practical Term-Project and Presentation	3rd to 14th	20	10%	a1, a2, b1, b2, c1, c2, d1
4.	Mid-Term Exam (Theoretically)	8th	20	10%	a1, a2, b1, b2, c2
5.	Final-Term Exam (Practically)	15th	20	10%	a1, b1, b2, c1, c2, d1
6.	Final-Term Exam (Theoretically)	16th	100	50%	a1, a2, b1, b2, c2, d1
Total Assessments Mark/Percentage			**200**	**100%**	

VIII. Learning Resources:

Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. Robert L. Boylestad, Louis Nashelsky, 2013, Electronic Devices and Circuit Theory, Prentice Hall, 11th Edition.
2. Thomas L. Floyd, 2012, Electronic devices, 9th Ed, USA, Pearson Prentice Hall.

2- Essential References.

1. Robert T. Paynter, 2006, Introductory to Electronic Devices and Circuits, Printice Hall.
2. J. Millman & A. Garbel -1978 - "Microelectronics", McGraw Hill.
3. S. H. Grove – 1997 - "Semiconductor physics and devices", John Wiley.
4. Sedra & K. Smith – 1998 - "Microelectronic Circuits", Holt, Rinehart and Winston.

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5. Richard C. Jaeger and Travis N. Blalock – 2011 – Microelectronic – 1 NIC circuit Design – 4/Edition – McGraw Hill Companies, USA – New York.
3- Electronic Materials and Web Sites etc.
1. http://www.ocw.mit.edu/courses. 2. https://www.youtube.com/playlist?list=PLww54WQ2wa5rOJ7FcXxi-CMNgmpybv7ei 3. Lectures will be prepared by lecturer. 4. Faculty Electronic Library.

IX. Course Policies:

1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged

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	from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat** **President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi** **Name of Reviewer from the Department: Assoc. Prof. Dr. Yahya Al-Naggar**
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa **Assoc. Prof. Dr. Ahmed Mujahed** **Asst. Prof. Dr. Munasar Alsubri**

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25. Template for Course Plan of Electronics 1

I. Information about Faculty Member Responsible for the Course:

Name of Faculty Member	Asst. Prof. Dr. Abdulkafi Al-Eriany	**Office Hours**					
Location & Telephone No.		**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail							

II. Course Identification and General Information:

1.	Course Title:	Electronics 1				
2.	Course Number & Code:	PME113				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	2	-	4
4.	Study level/year at which this course is offered:	Level 2- Semester 2				
5.	Pre –requisite (if any):	Electrical Circuits 1(PME111)				
6.	Co –requisite (if any):	Electrical Circuits 2(PME112)				
7.	Program (s) in which the course is offered	Electrical Engineering Department				
8.	Language of teaching the course:	English & Arabic				
9.	System of Study:	Regular				
10.	Mode of delivery:	Semesters				
11.	Location of teaching the course:	Inside the University, Faculty of Engineering Electrical Engineering Department				

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III. Course Description:

This course introduces fundamental principles and concepts of atomic structure, energy bands, semiconductor types and how to form deferent types of electronic devices. The first electronic device to be introduced is the diode, which is the simplest of semiconductor device but it plays a very vital role in electronic systems such as voltage rectifiers, clippers, clampers, voltage multiplier circuits and so on. Furthermore, we will study in details the two main types of transistors (BJTs and FETs) starting with construction, operation, parameters and characteristics, modeling, DC and AC analysis of each type with strong emphasis on the Metal Oxide Semiconductor FETs (MOSFETs).

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop**:**

1. Demonstrate knowledge of history and developed characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic materials and devices.
2. Describe principles and basic concepts of electronic devices, fabrication, characteristics, operations.
3. Solve electronics systems using appropriate methods and modeling techniques.
4. Analyze the electronics engineering in the field of industrial products.
5. Employ the international standards and technical specifications of analog electronics components while designing and integrating electronic systems.
6. Conduct laboratory experiments safely to verify theoretical concepts related to electronics components and devices.
7. Assess personal commitment to electronics engineering tasks and effectively manage time and resources.

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V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Solid state principles	▪ Course orientations. ▪ Atomic structure. ▪ Energy bands.	1st	2
2.	Semiconductor	▪ Silicon and Germanium atomic structure. ▪ Intrinsic and extrinsic semiconductor. ▪ Diffusion current. ▪ N-type and P-type semiconductors.	2nd	2
3.	Diode	▪ Operation and biasing. ▪ Forward biasing of the diode. ▪ Reversed biasing of the diode.	3rd	2
4.	Diode	▪ Diode V-I Characteristics. ▪ Temperature Effect. ▪ Basic and complicated diode circuits.	4th	2
5.	Diode applications	▪ Half- Wave and Full- Wave rectification circuits. ▪ Center tapped transformer. ▪ Clippers. ▪ Clampers.	5th	2
6.	Zener diode and LEDS	▪ Zener Characteristics and application.	6th	2

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		▪ Voltage regulation. ▪ Light Emitting Diode LED – Construction and operation.		
7.	Bipolar junction transistor (BJT)	▪ Types, construction and configurations. ▪ Operation and biasing.	7th	2
8.	Midterm exam	▪ All previous topics	8th	2
9.	Bipolar junction transistor (BJT)	▪ Load line and Q-Point determination. ▪ BJT as an Electronic Switch.	9th	2
10.	Bipolar junction transistor (BJT)	▪ BJT Modeling. ▪ re Model. ▪ Hybrid equivalent model (h-Parameters) ▪ AC analysis. ▪ Voltage amplification.	10th	2
11.	Field effect transistors (FETS)	▪ Classification. ▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	11th	2
12.	Junction field effect transistor (JFET)	▪ Modeling. ▪ AC analysis.	12th	2
13.	Depletion MOSFET (D-MOS)	▪ Classification. ▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	13th	2

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14.	Enhancement MOSFET (E-MOS)	▪ Construction. ▪ Operation. ▪ DC analysis. ▪ Output and transfer characteristics.	14th	2
15.	Overview	▪ All Topics	15th	2
16.	Final exam	▪ All Topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B – Tutorial Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Solid state principles	• Course orientations. • Atomic structure. • Energy bands.	1st	2
2.	Semiconductor	• Silicon and Germanium atomic structure. • Intrinsic and extrinsic semiconductor. • Diffusion current. • N-type and P-type semiconductors.	2nd	2
3.	Diode	• Operation and biasing. • Forward biasing of the diode. • Reversed biasing of the diode.	3rd	2
4.	Diode	• Diode V-I Characteristics. • Temperature Effect. • Basic and complicated diode circuits.	4th	2

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5.	Diode applications	• Half- Wave and Full- Wave rectification circuits. • Center tapped transformer. • Clippers. • Clampers.	5th	2
6.	Zener diode and LEDS	• Zener Characteristics and application. • Voltage regulation. • Light Emitting Diode LED – Construction and operation.	6th	2
7.	Bipolar junction transistor (BJT)	• Types, construction and configurations. • Operation and biasing.	7th	2
8.	Midterm exam	• All previous topics	8th	2
9.	Bipolar junction transistor (BJT)	• Load line and Q-Point determination. • BJT as an Electronic Switch.	9th	2
10.	Bipolar junction transistor (BJT)	• BJT Modeling. • r_e Model. • Hybrid equivalent model (h-Parameters) • AC analysis. • Voltage amplification.	10th	2
11.	FIELD EFFECT TRANSISTORS (FETS)	• Classification. • Construction. • Operation. • DC analysis. • Output and transfer characteristics.	11th	2

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12.	Junction field effect transistor (JFET)	• Modeling. • AC analysis.	12th	2
13.	Depletion MOSFET (D-MOS)	• Classification. • Construction. • Operation. • DC analysis. • Output and transfer characteristics.	13th	2
14.	Enhancement MOSFET (E-MOS)	• Construction. • Operation. • DC analysis. • Output and transfer characteristics.	14th	2
15.	Overview	• All Topics	15th	2
16.	Final exam	• All Topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

C – Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours
1.	▪ An Experiment to be familiarize with Measuring Instruments and Tools.	1st	2
2.	▪ Errors of measurement. ▪ Types of errors. ▪ Mathematical expression of errors	2nd	2
3.	▪ Forward biasing of the P-N Junction diode, verification of I-V Characteristics of P-N Junction Diodes.	3rd	2

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4.	▪ Half- Wave and Full-Wave Rectifiers, Center tapped transformer, output waveforms and filtration	4th	2
5.	▪ Measurement of Zener Diode Characteristics	5th	2
6.	▪ Measurement the output waveform of Clamper circuit	6th	2
7.	▪ Determination of the Q-Point of the collector characteristics	7th	2
8.	▪ Verification of DC parameters and variables of BJTs and FETs in different configurations	8th	2
9.	▪ BJT as an Electronic Switch	9th	2
10.	▪ Verification of AC parameters and variables of BJTs and FETs in different configurations	10th	2
11.	▪ Output characteristics of BJT	11th	2
12.	▪ Transfer characteristics of FETs	12th	2
13.	▪ Project Presentation	13th	2
14.	▪ Review	14th	2
15.	▪ Final Practical Exam	15th	2
Number of Weeks /and Units Per Semester		**15**	**30**

VI. Teaching strategies of the course:

- Active lectures
- Tutorials
- Projects and Report Presentations
- Laboratory hands-on work
- Design Work
- Case Studies

VII. Assignments:

No	Assignments	Aligned CILOs (symbols)	Week Due	Mark

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1.	P-N Junction Diode	a1, a2	2nd & 3rd	2
2.	Half-waves and Full-waves Rectifiers	a1, a2, b1, b2, c2, d1	4th	4
3.	Zener Diode	a1, a2, b1, c2	5th	2
4.	BJT Transistor DC &AC Analysis.	a1, a2, b1, b2, c2, d1	6th to 9th	6
5.	FET Transistors DC & Ac Analysis	a1, a2, b1, b2, c2, d1	10th to 13th	6
Total				**20**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Assignments& Homework	2nd to 15th	20	10%
2.	Lab work and experiments reports	4th to 13th	20	10%
3.	Practical Term-Project and Presentation	3rd to 14th	20	10%
4.	Mid-Term Exam (Theoretically)	8th	20	10%
5.	Final-Term Exam (Practically)	15th	20	10%
6.	Final-Term Exam (Theoretically)	16th	100	50%
Total Assessments Mark/Percentage			**200**	**100%**

IX. Learning Resources:

Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. Robert L. Boylestad, Louis Nashelsky, 2013, Electronic Devices and Circuit Theory, Prentice Hall, 11th Edition.

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2. Thomas L. Floyd, 2012, Electronic devices, 9th Ed, USA, Pearson Prentice Hall.
2- Essential References.
1. Robert T. Paynter, 2006, Introductory to Electronic Devices and Circuits, Printice Hall. **2.** J. Millman & A. Garbel -1978 - "Microelectronics", McGraw Hill. **3.** S. H. Grove – 1997 - "Semiconductor physics and devices", John Wiley. **4.** Sedra & K. Smith – 1998 - "Microelectronic Circuits", Holt, Rinehart and Winston. **5.** Richard C. Jaeger and Travis N. Blalock – 2011 – Microelectronic – 1 NIC circuit Design – 4/Edition – McGraw Hill Companies, USA – New York.
3- Electronic Materials and Web Sites etc.
1. http://www.ocw.mit.edu/courses. **2.** https://www.youtube.com/playlist?list=PLww54WQ2wa5rOJ7FcXxi-CMNgmpybv7ei **3.** Lectures will be prepared by lecturer. **4.** Faculty Electronic Library.

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X. Course Policies:	
1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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