Department offering the program: Electronics and Electrical Communications
Department offering the course: Electronics and Electrical Communications Engineering

Course Specification

1- Course basic information :

Course Code: ECE 123 Department requirement	**Course Title:** Electronics (2)	**Academic year: 2015-2016** **Level (1) – Semester : 2**
Field: Basic Engineering Sciences	**Teaching hours: Lecture [2] Tutorial [1] Lab [1]**	

2- Course Objectives	1. To teach students the fundamentals and characteristics of BJT. 2. To develop the student's skills to analyze Bipolar transistor Circuits and deduce Small Signal Bipolar Transistor Equivalent Circuit. 3. To teach students single Stage Transistor Amplifier 4. To introduce students to P-N junction Field Effect Transistor and Schottky Field Effect Transistor. 5. To teach students Insulated – gate Field Effect Transistor and deduce Field Effect Transistor equivalent circuit. 6. To encourage students to demonstrate SCR and UJT- multi-junction transistors.

3- Intended Learning Outcomes: ARS		**Course ILOs**
A- Knowledge and Understanding:	A.1 Explain concepts and theories of mathematics and sciences, appropriate to the Electronics.	A1.1 Explain concepts and theories of mathematics and sciences, appropriate to BJT Transistor and its circuits. A1.2 Explain concepts and theories of sciences, appropriate to Single Stage Bipolar Transistor Amplifier. A1.3 Explain concepts and theories of sciences, appropriate to Field Effect Transistor. A1.4 Explain concepts and theories of sciences, appropriate to Schottky Field Effect Transistor. A1.5 Explain concepts and theories of sciences, appropriate to Insulated – gate Field Effect Transistor. A1.6 Explain concepts and theories of sciences, appropriate to SCR, UJT and multi-junction transistors.
	A.3 Define characteristics of engineering materials related to the Electronics.	A3.1 Define characteristics of engineering materials related to BJT. A3.2 Define characteristics of engineering materials related to Field Effect Transistor. A3.3 Define characteristics of engineering materials related to Schottky Field Effect Transistor. A3.4 Define characteristics of engineering materials related to Insulated – gate Field Effect Transistor. A3.5 Define characteristics of engineering materials related to SCR, UJT and multi-junction transistors.

	A.4 Demonstrate principles of design including elements design, process and/or a system related to specific electronic devices.	A4.1 Demonstrate principles of design including elements design, process and/or a system related to BJT. A4.2 Demonstrate principles of design including elements design, process and/or a system related to Field Effect Transistor. A4.3 Demonstrate principles of design including elements design, process and/or a system related to Schottky Field Effect Transistor. A4.4 Demonstrate principles of design including elements design, process and/or a system related to Insulated – gate Field Effect Transistor. A4.5 Demonstrate principles of design including elements design, process and/or a system related to SCR, UJT and multi-junction transistors.
	A.8 Describe Current engineering technologies as related to Electronics (2).	A8.1 Describe Current engineering technologies as related to BJT. A8.2 Describe Current engineering technologies as related to Field Effect Transistor. A8.3 Describe Current engineering technologies as related to Schottky Field Effect Transistor. A8.4 Describe Current engineering technologies as related to Insulated – gate Field Effect Transistor. A8.5 Describe Current engineering technologies as related to SCR, UJT and multi-junction transistors.
	A.15 Interpret principles of analyzing and design of electronic circuits and components.	A.15.1. Interpret principles of analyzing of Bipolar transistor Circuits and Small Signal Bipolar Transistor Equivalent Circuit. A.15.2. Interpret principles of analyzing and design of Single Stage Bipolar Transistor Amplifier. A.15.3. Interpret principles of analyzing and design of Field Effect Transistor equivalent circuit and biasing circuit.
B- Intellectual Skills	B.2 Select appropriate solutions for engineering problems based on analytical thinking.	B2.1 Select appropriate solutions for BJT problems based on analytical thinking using dc analysis and load lines. B2.2 Select appropriate solutions for transistor problems based on analytical thinking using ac equivalent circuits.
	B.5 Assess and evaluate the characteristics and performance of components, systems and processes.	B5.1 Assess and evaluate the characteristics and performance of BJT. B5.2 Assess and evaluate the characteristics and performance of Field Effect Transistor.

		B5.3 Assess and evaluate the characteristics and performance of Schottky Field Effect Transistor. B5.4 Assess and evaluate the characteristics and performance of Insulated – gate Field Effect Transistor. B5.5 Assess and evaluate the characteristics and performance of SCR, UJT and multi-junction transistors.
	B.6. Investigate the failure of components, systems, and processes.	B6.1 Investigate the failure of BJT. B6.2 Investigate the failure of Field Effect Transistor. B6.3 Investigate the failure of Schottky Field Effect Transistor. B6.4 Investigate the failure of Insulated – gate Field Effect Transistor. B6.5 Investigate the failure of SCR, UJT and multi-junction transistors.
C- Professional Skills	C.1 Apply knowledge of mathematics, science, and engineering practice integrally to solve engineering problems.	C1.1 Apply knowledge of mathematics, science, design, and engineering practice integrally to solve BJT transistor circuits problems. C1.2 Apply knowledge of mathematics, science, design, and engineering practice integrally to solve Field Effect Transistor problems. C1.3 Apply knowledge of mathematics, science, design, and engineering practice integrally to solve Schottky Field Effect Transistor problems. C1.4Apply knowledge of mathematics, science, design, and engineering practice integrally to solve Insulated – gate Field Effect Transistor problems. C1.5 Apply knowledge of mathematics, science, design, and engineering practice integrally to solve SCR, UJT and multi-junction transistors problems.
	C.5 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	C5.1 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results related to BJT, FET, Schottky Field Effect Transistor, Insulated – gate Field Effect Transistor, SCR, UJT and multi-junction transistors applications.
	C.8 Apply safe systems at work and observe the appropriate steps to manage risks.	C8.1 Apply safe systems at work and observe the appropriate steps to manage risks during doing experiments related to BJT, FET, Schottky Field Effect Transistor, Insulated – gate Field Effect Transistor, SCR, UJT and multi-junction transistors.

	C.12 Prepare and present technical reports.	C12.1 Prepare and present technical reports about topics related to BJT, FET, Schottky Field Effect Transistor, Insulated – gate Field Effect Transistor, SCR, UJT and multi-junction transistors.
D- General Skills	D.1 Collaborate effectively within multidisciplinary team. D.2 Work in stressful environment and within constraints. D.3. Communicate effectively D.6 Effectively manages tasks, time, and resources. D.7 Search for information and engage in life-long self learning electronics.	D1.1 Collaborate effectively within multidisciplinary team during laboratory work. D2.1 Work in stressful environment and within constraints during solving problems, doing experiments and in exams. D3.1 Communicate effectively in tutorial and lab. times. D6.1 Effectively manages tasks, time, and resources during solving problems, doing experiments and in exams. D7.1 Search for information on topics related to Electronics.

4- Course Contents	Bipolar Junction Transistor fundamentals - Bipolar Junction Transistor Characteristics - Bipolar transistor Circuits - Small Signal Bipolar Transistor Equivalent Circuit - Single Stage Bipolar Transistor Amplifier –Field Effect Transistor – Schottky Field Effect Transistor – Insulated – gate Field Effect Transistor - Field Effect Transistor equivalent circuit and biasing circuit- SCR – UJT- multi-junction transistors.
5- Teaching and Learning Methods	- Lectures - Tutorials - Laboratory - Research assignments
6- Teaching and Learning Methods for disable students	• Official low cost special classes for developing student skills, arranged by the faculty administration. • Assign a portion of the office hours for those students. • Repeat the explanation of some of the material at Labs and tutorials.
7- Student Assessment	
a- Assessment Methods	- Weekly sheet exercises/Reports at class room and labs. - Quizzes - Oral and practical exam - Midterm, and final exams
b- Assessment Schedule	- Exercise sheet : Weekly - Quizz-1: Week no 4 - Mid-Term exam: Week no 8 - Quizz.2: Week no 12 - Oral and practical exam Week no 15

	- Final – term examination:	Week no 16
c- Weighting of Assessment	- Class work and quizzes : - Mid-term examination: - Oral and practical exam - Final – term examination: Total	10 % 10 % 20 % 60 % 100 %
8- List of text books and references:		
a- Course notes	There are lectures notes prepared in the form of a book authorized by the department	
b- Text books	[1] Albert P. Malvino, Electronic Principles, 2006 Amazon publisher	
c- Recommended books	[1] Alyis J. Evans, Basic Electronics, ISBN: 980945053224, 2004, Master publishing: [2] John Sparkes, Semiconductor Devices, 2nd Edition, 1994 [3] P. Arun, Electronics, 2006, Amazon publisher.	
d- Periodicals, Web sites ……etc	http://www.electronics-tutorials.ws/transistor/tran_1.html http://hyperphysics.phy-astr.gsu.edu/Hbase/Electronic/fet.html http://www.iue.tuwien.ac.at/phd/ayalew/node100.html	

Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Bipolar Junction Transistor fundamentals - Bipolar Junction Transistor Characteristics	1-2	A1.1, A3.1, A4.1, A8.1	B2.1, B5.1, B6.1	C1.1, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Bipolar transistor Circuits - Small Signal Bipolar Transistor Equivalent Circuit -	3-4	A1.1, A15.1	B2.2	C1.1, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Single Stage Bipolar Transistor Amplifier istors.	5	A1.2, A4.1, A15.2		C1.1, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Field Effect Transistor	6-7	A1.3, A3.2, A4.2, A8.2	B5.2, B6.2	C1.2, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Schottky Field Effect Transistor	9	A1.4, A3.3, A4.3, A8.3	B5.3, B6.3	C1.3, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Insulated – gate Field Effect Transistor	10-11	A1.5, A3.4, A4.4, A8.4	B5.4, B6.4	C1.4, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1
Field Effect Transistor equivalent circuit and biasing circuit-	12	A1.5, A15.3	B2.2	C1.4, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1

SCR – UJT- Multi-junction trans	13-14	A1.6, A3.5, A4.5, A8.5	B5.5, B6.5	C1.5, C5.1, C8.1, C12.1	D1.1, D2.1, D3.1, D6.1, D7.1

Teaching and Learning Methods - ILOs Matrix

Teaching and Learning Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Lectures	A1, A3, A4, A8, A15	B2, B5, B6	C1	D3
tutorials	A1, A3, A4, A8, A15	B2, B5, B6	C1	D1, D2, D3, D6.,
Labs	A1, A3, A4, A8, A15	B2, B5, B6	C5, C8	D1, D2, D3, D6,
Reports	A1, A3, A4, A8, A15	B2, B5, B6	C1,C5,C8,C12	D2,D3, D6, D7

Assessment Methods - ILOs Matrix

Assessment Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Weekly sheet exercises	A.1, A.3, A.4, A.8, A.15	B.2, B.5, B.6	C.1	D.3,D.6,D.7
Reports	A.1, A.3, A.4, A.8, A.15	B.2, B.5, B.6	C.1, C.12	D2.D3, D6, D7
Quizzes	A.1, A.3, A.4, A.8, A.15	B.2, B.5, B.6	C.1	D2, D6, D7
Oral and practical exam	A.1, A.3, A.4, A.8, A.15	B.2, B.5, B.6	C5, C8	D2, D6, D7
Midterm, and Final Written exams	A.1, A.3, A.4, A.8, A.15	B.2, B.5, B.6	C.1	D2, D6, D7

Authorized from department board at 15/05/2016
Authorized from college board at 05/06/2016

Course coordinator:
Prof. Saber Zaineldeen

Head of Department:
Prof. Fathi El-Sayed Abd El-Samie