

Electronics I

Module Code: Phys-M2061;	EtCTS of Course: 5 ;	Course Status:	Compulsory
Course Title :	Electronics I		
Course Code:	Phys2062	Credits Hours:	3
Mode of delivery:	Full Semester;	Weeks required:	16
Prerequisite(s):		Co-requisite(s):	
Academic Year:	20____/____ ;	Year/Semester:	II/ II
Students' College/Faculty:	____;	Department:	Physics
Program:	Undergraduate	Enrollment:	____
Instructor's Name (Coordinator)	_____		
Address: Email: _____	Block No _____;	Rm. No. _____	
Class Hours:	_____		

Method of Teaching

Presentation of the course is through lecture and accompanying laboratory hands on experience. Related guided problems section with demonstrator assistance and additional assessed homework. Online learning resources.

Date	Topics	Pedagogical Approaches	Teachers' Tasks/Activities	Students' Tasks/Activities
Week 1	Network theories and Equivalent circuits • Kirchhoffs rules • Mesh analysis • Nortons theorem • Thevenins Equivalent circuits	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering, solving problems Hands-on practical works.
Week 2	• Thevenin's Equivalent circuits • Conversion of Thevenins to Nortons Equivalent circuits • Delta and Y Network	Lecture Supervised practical unsupervised practical problem solving self study	Deliver lecture Lead supervised practical exercises Set and deliver problem Set I	Proactive in questioning, answering, solving problems Hands-on practicals.
Assignment I				

Date	Topics	Pedagogical Approaches	Teachers' Tasks/Activities	Students' Tasks/Activities
Week 3	The physics of semiconductors • Formation of energy bands • Metals, insulators and semiconductors • Intrinsic and extrinsic semiconductors, • P type and N type extrinsic semiconductors • Carrier mobility, drift velocity and drift current density	Lecture Demonstration problem solving self study Exam	Deliver lecture and demonstrate. Set questions and problems Set Test I	Proactive in questioning, answering, solving problems Prepare for TEST I
Week 4	Semiconductor diodes • The PN junction • V-I characteristics of a PN junction diode • Ideal diode equation • PN junction breakdowns • Diode circuit analysis	Lecture Supervised practical unsupervised practical problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering, solving problems Hands-on practical works
Week 5	• Diode as a rectifier • Half wave and Full wave rectifier • How effectively a rectifier converts AC in to DC • Types of diodes	Lecture Supervised practical unsupervised practical problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering and solving problems Hands-on practical works
Test I				

Week 6	Bipolar junction transistors (BJT) • PNP and NPN transistors • the surprising action of a transistor • the working of a transistor • Transistor amplifying action • Transistor configurations	Lecture Supervised practical unsupervised practical problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering, solving problems Hands-on practical works
Week 7	• Biasing the BJT for discrete circuit design • Biasing single stage BJT amplifier configurations (Common emitter, base and collector configuration) • Transistor Operation • Transistor Parameter • Analysis of transistor circuits at DC	Lecture Supervised practical unsupervised practical problem solving self study	Deliver lecture Lead supervised practical exercises Set and deliver problem Set II	Proactive in questioning, answering and solving problems Hands-on practical works Solve problem.
Assignment II				

Date	Topics	Pedagogical Approaches	Teachers' Tasks/Activities	Students' Tasks/Activities
Week 8	Field Effect Transistors • The junction field-effect transistor (JFET), JFET Common Source Amplifier, JFET • Common Drain amplifier	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering and solving problems Hands-on practical works
Week 9	• Insulated-Gate Field Effect Transistor. Power, • Multiple Transistor Circuit			
Week 10	Operational Amplifiers and Oscillations • Open loop Amplifiers, • Ideal Amplifiers, Approximation Analysis, Ope-loop Gain. • The Ideal Op-Amp • Analysis of Circuit Containing Ideal Op-Amps-Inverting Configuration	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering and solving problems Hands-on practical works
Week 11	• Applications of the Inverting Configurations • The Noninverting Configuration • Examples of Op-Amp Circuits • Transister amplifier, biasing points	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practicals Set and deliver TEST II	Proactive in questioning, answering and solving problems Hands-on practical works Prepare for test
Test II				
Week 12	Digital Circuits • Number systems, Boolean Algebra, Logic Gates, • Combinational Logic, • Multiplexes and decoders, Schmitt Trigger, Two-State storage elements	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering and solving problems Hands-on practical works
Week 13	• Latches and un-clocked flip-flops; • Dynamically clocked flipiflops, • One-shot registers • Digital information in series, parallel or timed signals	Lecture Learning by doing problem solving self study	Deliver lecture Lead supervised practical exercises Set assignment III	Proactive in questioning, answering and solving problems Hands-on practical works Solve problems in class and at home.
Assignment II				
Week 14	Data Acquisition and Process Control • Transducers, Signal Conditioning • Circuits, Oscillators • Radio basics AM Receivers and RF Spectrum	Lecture Learning by doing problem solving Group work self study	Deliver lecture Lead supervised practical exercises	Proactive in questioning, answering and solving problems Hands-on practical works Solve problem.
Week 15	Revision and practicing model exam, students self study			
Week 16	Final Examination			

Recommended References

Course Textbook

Bernard Grob, *Basic Electronics*, 4th ed., McGraw Hill International Book Company, London, (1983).

References

1. Frederick F. Driscoll; Robert F. Coughlin. *Solid State devices and Applications*, D.B Taraporevala Sons and Co.PVT, Published with arrangement with Prentice Hall, Inc. (1981).
2. Close K.J and J Yarwood. *Experimental Electronics for Students*, London Chapman and Hall, Halsted Press Book, John Woley and Sons, (1979).
3. Tayal D.C. *Basic Electronics*. 2nd ed. Himalaya Publishing House Mumbai, (1998).
4. Theraja B.L., R.S. Sedha. *Principles of Electronic Devices and Circuits*, S.Chand and Company Ltd, New Delhi, (2004).
5. Sparkes J.J. *Semiconductor Devices* 2nd ed. Chapman and Hall, London, (1994).
6. Richard R. Spenser and Mohammed S. Ghaussi. *Introduction to Electronic Circuit Design*, Prentice Hall, Pearson Education, Inc (2003).
7. Noel M Morriss. *Semiconductor Devices*, MacMillan Publishers Ltd. (1984).
8. Albert P. Malvino -Electronic Principles
9. Taub and Shilling - Digital Integrated Electronics
10. Ronald J.Tocci, Neal S.Widmer - Digital Systems
11. Schuler and Fowler- Basic Electricity and Electronics
12. T.E Price-Analog Electronics
13. James J.Brophy - Basic Electronics for Scientists