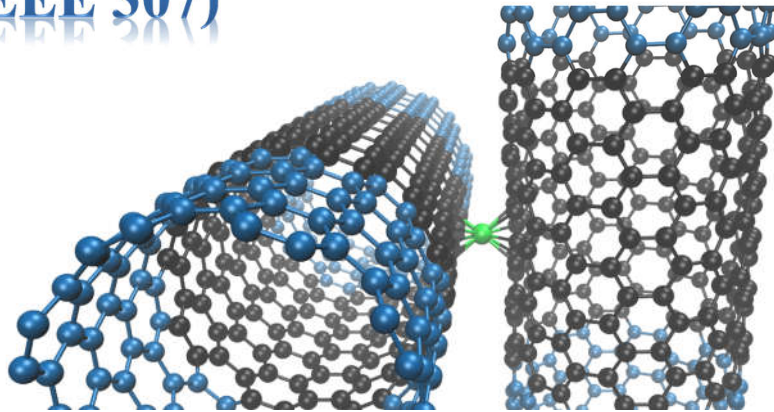


ELECTRICAL PROPERTIES OF MATERIALS (EEE 307)



1

Course Teacher

Dr. Muhammad Anisuzzaman Talukder
Professor
Department of EEE, BUET

Contact Info

Email: anis@eee.buet.ac.bd
Website: <https://anis.buet.ac.bd/>
Phone: 55167100 Ext. 6582
Office: ECE 527

2

Course Website

Please check

https://anis.buet.ac.bd/properties_of_materials.html/

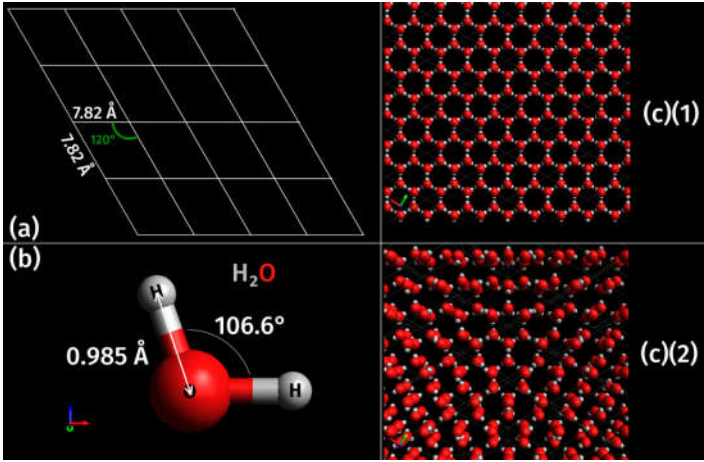
for EEE 307 lecture notes, grades, and updates.

3

COURSE OVERVIEW

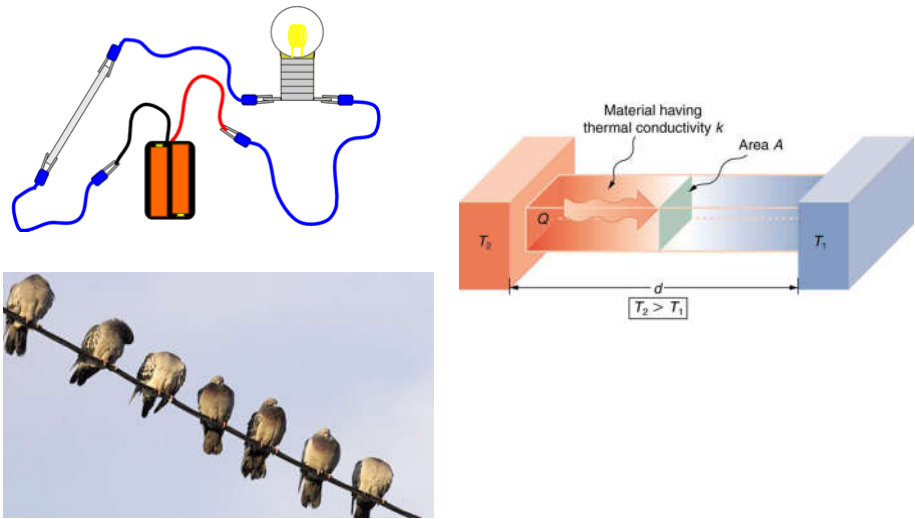
4

Crystal Structure



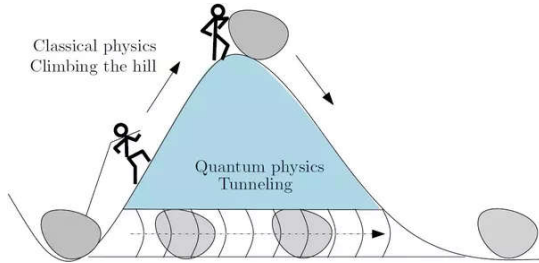
5

Electrical and Thermal Conductivity



6

Quantum Mechanics



7

Band Theory



8



Theory of Metals

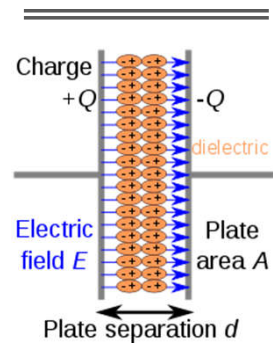
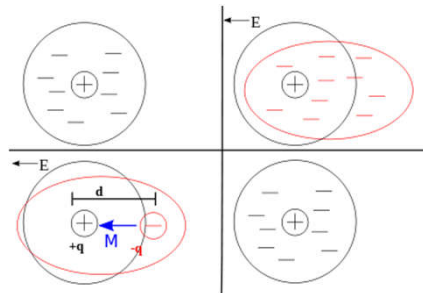
- Quantum theory of metal
 - Free electron model
 - Conduction in metals

			Aluminium	Silicon	Phosphorus	Sulfur	Chlorine	Argon	
4	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
5	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
6	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	
7	110	111	112	113	114	115	116	117	

9

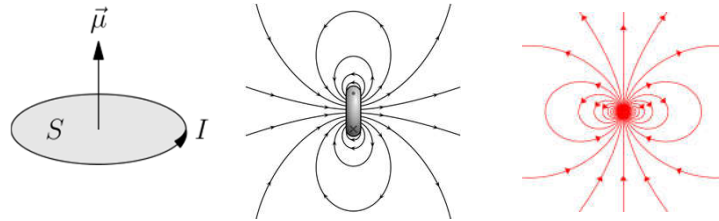
Dielectric Properties

10

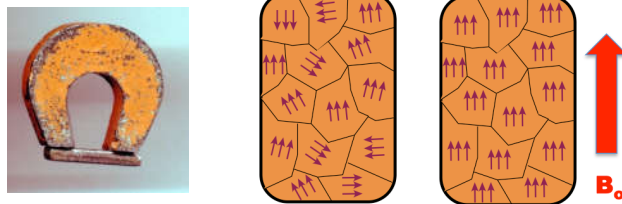


Magnetic Properties

Magnetic moment, permeability



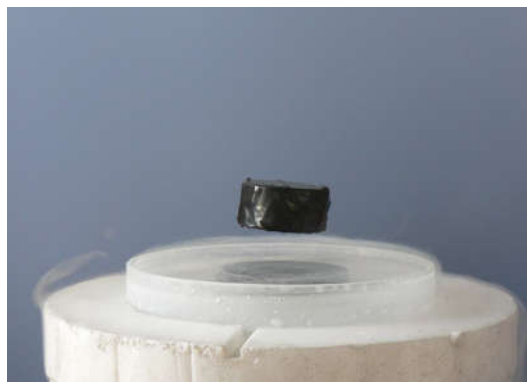
Ferromagnetism and magnetic domains



11

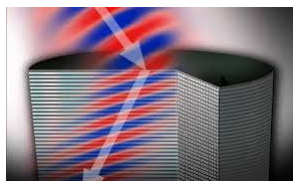
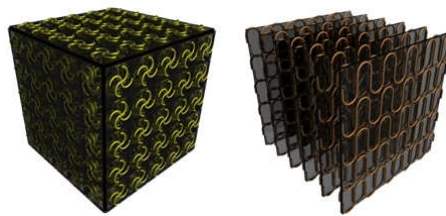
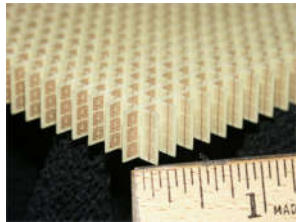
Superconductivity

- Zero resistance and Meissner effect
- Type I and type II superconductors



12

Metamaterial



13

Time Line

- Crystal structures – 1 week
- Electrical and thermal conduction – 2 weeks
- Quantum mechanics – 2 weeks
- Band theory – 2 weeks
- Theory of metals – 1 week
- Dielectric properties – 2 week
- Magnetic properties – 2 week
- Superconductivity – 1 week
- Metamaterial – 1 week

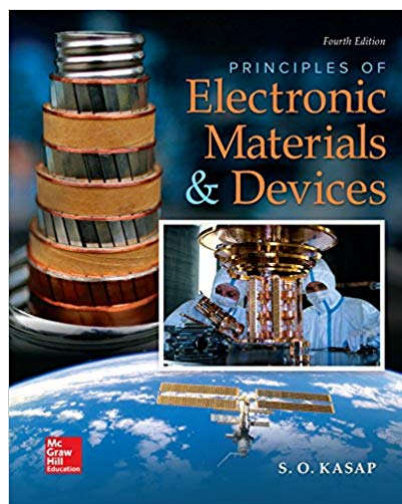
14

Continuous Assessment

- Four class tests at roughly regular intervals.
- If the policy changes, you will be notified.

15

Text Book



16

Good News!

- Materials covered will be helpful for
 - In-depth understanding of behavior of many many devices
 - Research
 - Graduate studies



17

Bad News!

Be Serious About Class Tests



18

No Phones, No Laptops in Class



19

First Assignment

- Email to anis@eee.buet.ac.bd with
 - **Subject:** EEE 307
 - **Body:** “Your Name, Student Number” <email address>
- It will help me to keep you posted on the course updates.

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