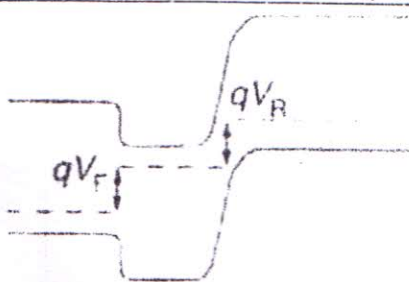


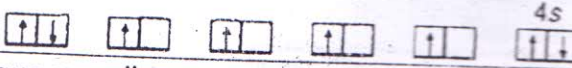


### Materials Specifications

Answer the 40 statements and figures by correct (c) or false (f) at the left column? The wrong answer will be marked by -2.5.

1	Optimum safe load-bearing capacities of structures depend on the strength-to-density ratio.																			
2	Manufacturing and assembly operations are required to create the engineering materials																			
3	Bad designs of components and systems successes if good materials are selected.																			
4	<p style="text-align: right;">Scope of materials science and engineering.</p>																			
5	Ceramics are composed of metallic and semimetal elements drawn from opposite ends of the Periodic Table.																			
6	Long-chain, very low molecular weight hydrocarbons are the basic building blocks of polymers.																			
7	Charge is distributed so that the atom is electrically neutral.																			
8	<table border="1" style="width: 100%;"> <thead> <tr> <th>Auger process</th> <th>X-ray process</th> </tr> </thead> <tbody> <tr> <td>Fermi level</td> <td>0</td> </tr> <tr> <td>M<sub>4,5</sub></td> <td>27 eV</td> </tr> <tr> <td>M<sub>2,3</sub></td> <td>34.6 eV</td> </tr> <tr> <td>M<sub>1</sub></td> <td>60.3 eV</td> </tr> <tr> <td>L<sub>3</sub></td> <td>455.5 eV</td> </tr> <tr> <td>L<sub>2</sub></td> <td>461.5 eV</td> </tr> <tr> <td>L<sub>1</sub></td> <td>563.7 eV</td> </tr> <tr> <td>K</td> <td>4966.4 eV</td> </tr> </tbody> </table>	Auger process	X-ray process	Fermi level	0	M <sub>4,5</sub>	27 eV	M <sub>2,3</sub>	34.6 eV	M <sub>1</sub>	60.3 eV	L <sub>3</sub>	455.5 eV	L <sub>2</sub>	461.5 eV	L <sub>1</sub>	563.7 eV	K	4966.4 eV	
Auger process	X-ray process																			
Fermi level	0																			
M <sub>4,5</sub>	27 eV																			
M <sub>2,3</sub>	34.6 eV																			
M <sub>1</sub>	60.3 eV																			
L <sub>3</sub>	455.5 eV																			
L <sub>2</sub>	461.5 eV																			
L <sub>1</sub>	563.7 eV																			
K	4966.4 eV																			
9	For elements to bond covalently they must have at least a half-filled outer electron																			

	shell.	
10	All materials expand to one extent or another when heated.	
11	Ionic materials like NaCl, Ag, and Cu.	
12	The density of states $N(E)$ specifies the total number of states that lie between energy $E$ and energy $E + dE$ .	
13	In field emission, electrons leave the metal without increasing their energy.	
14	Insulators have no electrons so heat is transferred via photons.	
15	Type I superconductors have two critical values for $H_c$ .	
16	Dielectrics often possess microscopic permanent dipole moments.	
17	In high-speed pulse circuits and transmission lines, low capacitance is essential.	
18	Ferromagnetic materials have permanent electric dipoles.	
19	Large dielectric constants are noteworthy because they enable capacitors and microwave components to be miniaturized.	
20	Liquid crystals consist of rod like organic polymers.	
21	The de Broglie relationship provides a way to rationalize the stability of electron orbits in atoms.	
22	The far they are to the nucleus, the lower the energies of the electrons.	
23	The Pauli principle states that no two electrons in an atom can have the same four quantum numbers.	
24	Semiconductor materials are generally soft and brittle.	
25	The Si lattice is flattened into a plane schematically preserving the character of the tetrahedral covalent bonding.	
26	Semiconductors become useful in devices only when selected impurities or dopants are introduced.	
27	Whenever electronic materials contact each other, the Fermi energies will not be equal.	
28	When a forward bias voltage $V$ is applied across the p-n junction, respective majority carriers are pulled away from the junction.	
29	 <p>Band diagram of an unbiased p-n-p transistor.</p>	
30	In designing a thermocouple we must consider the Seebeck potential output.	
31	When current $I$ flows through a junction of dissimilar conductors, heat can be either absorbed or liberated, depending on the current magnitude.	
32	In diamagnetic materials, the magnetism is induced where none existed before.	
33	Atomic magnetic moments are directly proportional to the angular momentum of electrons.	

34	There are no permanent moments in diamagnetic material initially and when an H field is applied, magnetic moments are induced in atoms.		
35	<p>Number of electrons      ←      Electronic structure      →      Magnetic moment (Bohr magnetons)</p> <p>Atom      Fe      25            4</p>		
36	There are optically opaque as well as transparent ferromagnets.		
37	The fraction coefficient of polypropylene microfiber with glass is less than fraction coefficient of rubber with glass.		
38	Pyrex has an excellent thermal conductivity which allows high temperature gradients.		
39	Epoxy resin belongs to a rigid thermoplastic resins group.		
40	Isolated oxidation induced stacking fault may cause excessive leakage current.		
Best Regards		Mohamed Nayel	