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### Test Item File

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## Chapter 1 Fundamental Solid-State Principles

1) The nucleus	of an atom contains			
A) proton	s and electrons.		B) neutrons an	d electrons.
C) neutrons and protons.		D) neutrons, protons, and electrons.		
	e valence electron, tin hich of these elements			rgon has eight valence
A) Gold		B) Tin		C) Argon
3) As a result of	of covalent bonding, in	trinsic silicon effe	ectively acts as a	/an
A) insulat	cor.	B) semiconduct	tor.	C) conductor.
4) The differen	ce between the energy	v levels of two orl	oital shells is call	ed the
A) conduction gap. B) energy band.		d.		
C) valenc	e band.		D) energy gap.	
5) Which of the	e following statements	is true?		
	ons cannot continually shells.	orbit the nucleus	of an atom in the	e space that exists betwee
B) There	is no specific energy le	evel that is associa	ated with a given	orbital shell.
<u>-</u>	ectron jumps from an nigher-energy shell pe		ne that has a higl	her energy level, it remair
6) Which of the	e following is not a cor	nmonly used sen	niconductor in el	lectronic applications?
A) Carbon	n B) Lea	d	C) Silicon	D) Germanium
7) Which of the	e following is a result o	of covalent bondi	ng in intrinsic sil	licon?
A) Atoms	are held together.			
	oms are electrically sta	ble.		
C) The ma	aterial acts as an insula	ator.		
•	the above are results of			
8) Which somi	conductor element is r	nost often used in	the production	of solid state devices?
•			•	
A) Carboi	n B) Lea	u	C) Silicon	D) Germanium

9) Conduction through temperature increas	_	ive temperature coefficie	ent tends to as		
A) increase					
B) decrease					
C) remain relative	ely unchanged				
10) Pentavalent element	s have valence	e electron(s).			
A) one	B) three	C) five	D) eight		
11) Trivalent elements h	nave valence e	lectron(s).			
A) one	B) three	C) five	D) eight		
12) Doping is used to					
A) decrease the co	onductivity of an intrins	ic semiconductor.			
B) increase the co	nductivity of an intrinsi	ic semiconductor.			
C) limit the condu	activity of an intrinsic se	emiconductor.			
13) When pentavalent e	-	ing, the resulting materia	al is called		
A) n-type; valenc	e-band holes	B) n-type; cond	duction-band electrons		
C) p-type; valence-band holes D) p-type; conduction-ba		duction-band electrons			
14) When trivalent elemand has an excess of		, the resulting material is	s called material		
A) n-type; valence-band holes		B) n-type; cond	B) n-type; conduction-band electrons		
C) p-type; valence-band holes		D) p-type; conduction-band electrons			
15) The time between th	ne forming of an electron	n-hole pair and recombin	nation is called		
A) charge time.		B) recombination	B) recombination time.		
C) lifetime.		D) conduction t	ime.		
16) In an n-type materia	al, the majority carriers	are			
A) conduction-ba	and electrons.				
B) conduction-ba	and holes.				
C) valence-band	electrons.				
D) valence-band	holes.				
E) neutral atoms.					

17) In a p-type material, the minori	ty carriers are			
A) conduction-band electrons	3.			
B) conduction-band holes.				
C) valence-band electrons.				
D) valence-band holes.				
E) charged atoms.				
18) N-type materials are electrically	in their natural s	tate.		
A) negative	B) positive	C) neutral		
19) A depletion layer acts as a/an				
A) insulator.	B) semiconductor.	C) conductor.		
20) P-type materials are electrically	in their natural st	ate.		
A) negative	B) positive	C) neutral		
21) Pentavalent atoms are often refe	rred to as			
A) donor atoms.	B) min	ority carriers.		
C) acceptor atoms.	D) majority carriers.			
22) Trivalent atoms are often referre	ed to as			
A) donor atoms.	B) min	ority carriers.		
C) acceptor atoms.	C) acceptor atoms. D) majority carriers.			
23) The small amount of current tha	t is present at the forming o	of a pn junction is called		
A) knee current.	B) diff	B) diffusion current.		
C) barrier current.	D) dep	letion current.		
24) A p-type material is joined with the junction is approximately 70	J 1	e		
A) silicon. B) go	ermanium. C) carb	oon. D) lead.		
25) When a pn junction is reverse bid	ased, its resistance is			
A) high.				
B) low.				
C) determined by the compor	ents that are external to the	e device.		

26) A pn junction is forw	ard biased when				
A) the applied pot material.	ential causes the n-type	material to be more posi-	tive than the p-type		
B) the applied pot material.	ential causes the n-type	material to be more nega	tive than the p-type		
C) both materials a	are at the same potential				
D) Both A and C a	bove.				
27) Why is silicon more components?	commonly used than ge	rmanium in the producti	on of solid-state		
A) It is cheaper.		B) It is easier to p	roduce.		
C) It is more tolera	ant of heat.	D) All of the above	ve.		
28) When a pn junction i device acts as a near-		pletion layer is at its	width and the		
A) minimum; cond	ductor	B) minimum; ins	ulator		
C) maximum; con	ductor	D) maximum; ins	sulator		
29) When a pn junction i acts as a near-perfec		oletion layer is at its	width and the device		
A) minimum; cond	ductor	B) minimum; ins	ulator		
C) maximum; con	ductor	D) maximum; ins	sulator		
30) When a pn junction i materials is called	s forward biased, the co	mbined resistance of the	p-type and n-type		
A) net resistance.		B) total resistance	e.		
C) bulk resistance.		D) forward resist	ance.		
31) Which of the following	ng is an advantage of tra	nsistors over vacuum tub	oes?		
A) Transistors are smaller.		B) Transistors us	B) Transistors use more power.		
C) Transistors are	fragile.	D) All of the above	ve .		
32) The simplest model of	of the atom is called the				
A) covalent bond	model.	B) conduction bo	ond model.		
C) Bohr model.		D) energy gap m	odel.		
33) Which of the following	ng is not a trivalent dopi	ing element?			
A) Aluminum	B) Arsenic	C) Boron	D) Gallium		

34) The voltage across a forward-biased germanium pn junction is approximately

A) 0.1 V.

B) 0.3 V.

C) 0.7 V.

D) 0.8 V.

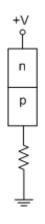


Figure 1-1

35) Referring to Figure 1–1. What type of junction bias is shown?

A) Forward bias

B) Reverse bias

C) Zero bias

#### Chapter 1 Fundamental Solid-State Principles Answer Key

- 1) C
- 2) A
- 3) A
- 4) D
- 5) A
- 6) B
- 7) D
- 8) C
- 9) A
- 10) C
- 11) B
- 12) B
- 13) B
- 14) C
- 15) C
- 16) A
- 17) A
- 18) C
- 19) A
- 20) C
- 21) A 22) C
- 23) B
- 24) A
- 25) A
- 26) B
- 27) D
- 28) A
- 29) D
- 30) C
- 31) A
- 32) C
- 33) B
- 34) B 35) B