

Sign Name K. An Print Name \_\_\_\_\_  
(1 pt name) (100 pts, 8 pages -> Scantron sheet) White

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
Circle answers on this form for backup to the scantron.

I. Multiple Choice (2 pts each, 24 pts) Choose the one best statement in each question.

1. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:

- a) a carbon atom
- b) an atom of sulfur
- c) another hydrogen
- d) a nitrogen atom

NA = not attempt  
NW = no work

2. A molecule with 4 pairs of VSEPR electron pairs around the central atom has:

- a) trigonal bipyramidal, 120° angle
- b) trigonal planar, 90° angle
- c) tetrahedral geometry, 109.5° angle
- d) octahedral geometry, 120° angle

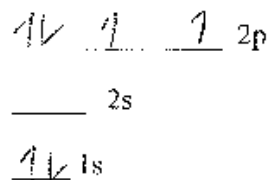
3. For intermolecular forces the general progression from strongest to weakest intermolecular force is:

- a) Hydrogen bonding > dipolar > van der Waals
- b) Van der Waals > hydrogen bonding > dipolar
- c) Dipolar > hydrogen bonding > van der Waals
- d) None of the above is correct.

4. Choose the one statement below which is incorrect

- a) p subshell has a maximum of 6 electrons
- b) d subshell has a maximum of 10 electrons
- c) f subshell has a maximum of 14 electrons
- d) all the above statements are true
- e) all of the above statements are false.

5. The following is a violation of



- a) Aufbau principal
- b) Pauli exclusion
- c) Hund's rule
- d) The electron configuration has no error and violates no rules.

6. For the element **P**, circle the one incorrect statement.

- a) The atomic number is 15
- b) The atomic mass is 30.97
- c) The number of electrons for a neutral atom is 31
- d) The number of valence electrons is 5

7. Choose the most electronegative element among the elements shown.

- a) Mg
- b) Si
- c) S
- d) Cl

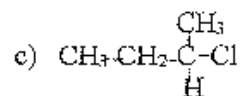
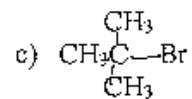
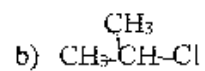
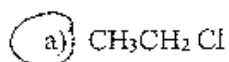
8. Which of the following bonds is a covalent bond ?

- a) SO<sub>2</sub>
- b) MgCl<sub>2</sub>
- c) Li<sub>2</sub>O
- d) BaO

9. Which of the following molecules is unstable with 8 electrons in its valence shell ?

- a) He
- b) S
- c) Si
- d) N

10. Choose the primary alkyl halide from the list below



11. The element Ge has how many total number of electrons ?

a) 4 electrons

b) 14 electrons

c) 72 electrons

d) 32 electrons

12. An alkane with 7 carbons is called:

a) octane

b) nonane

c) septane

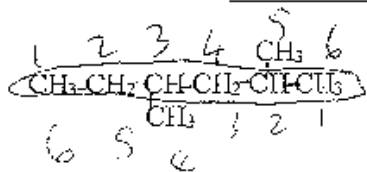
d) heptane

II. Short Answers (42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name 2,4-dimethylhexane



hexane

methyloyl

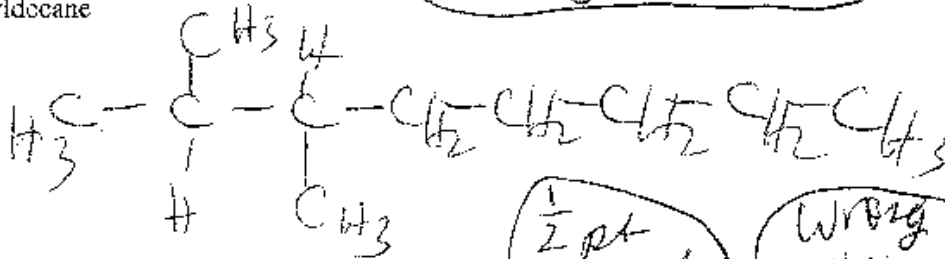
2,4 dimethyl  
or 3,5

# 2 pt

2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

Wrong # C - 1/2

2,3-dimethyloctane

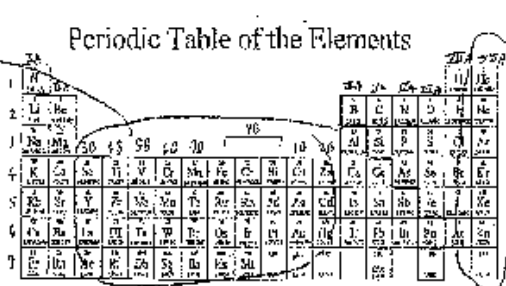


1/2 pt each methyl

Wrong # 4 - 1/2

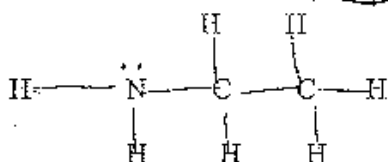
B. Short Answers Part of Short Answers (36 pts)

1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

(C)  Periodic Table of the Elements

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Xe	Rn

2. For the following molecule, give a condensed structure for the given line bond (structural formula) structure. (8 pts)



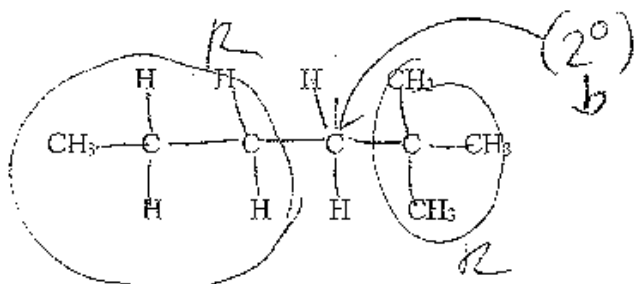
Wrong #C  
-4

sketch -4

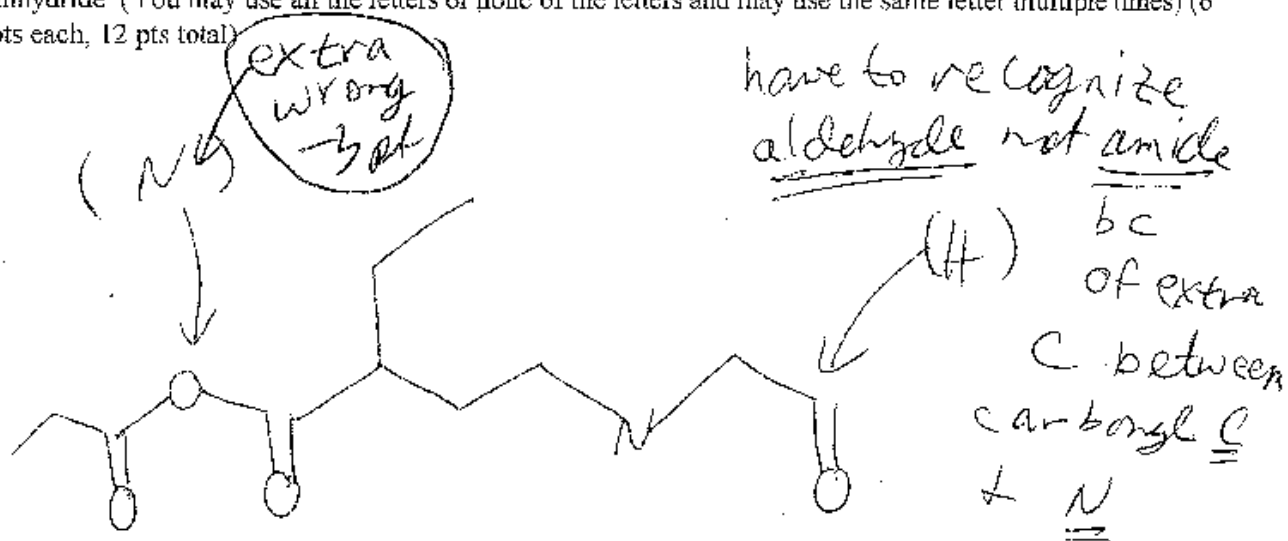
$H_2NCH_2CH_3$

MISSING small part -1 pt

4. For the carbon to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)



2. Given the following molecule, fill in the parenthesis with the letter of the functional group. (A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine (H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6 pts each, 12 pts total)

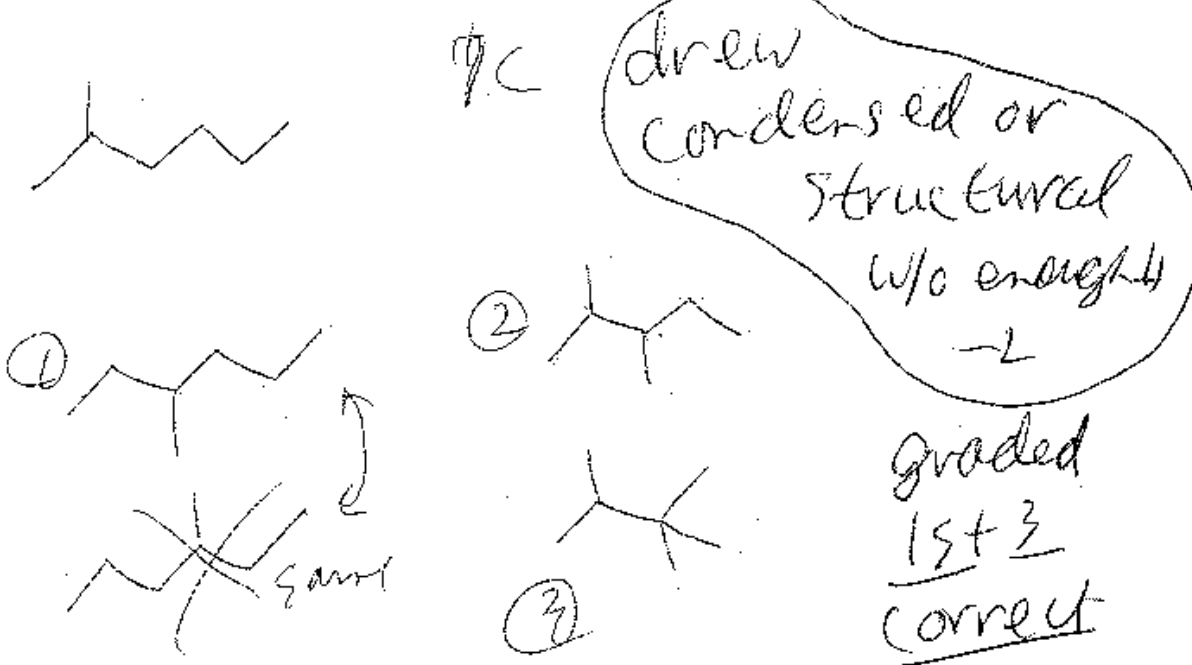


have to recognize aldehyde not amide

(H) bc of extra C between carbonyl C + N

Part III. Long Answers (33 pts) Show work where applicable.

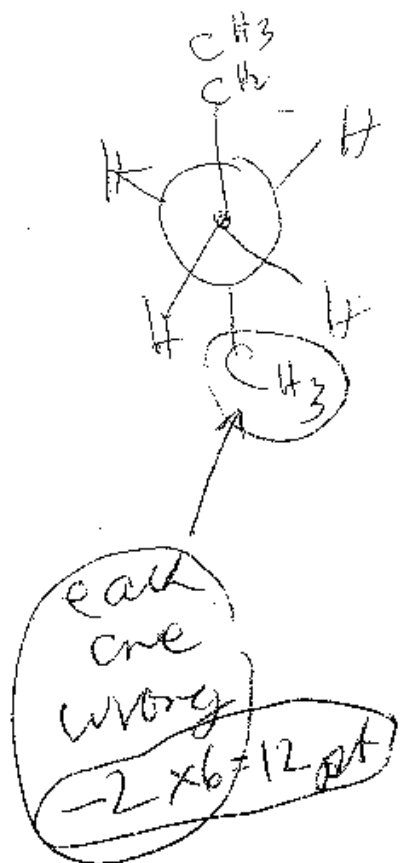
1. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts)



2. For the following molecule, show the correct Newman projection for the lowest energy. (15 pts)



between 2  
circled C with the  
eye from the left



energy  
wrong -3pt

bad  
frame -6pt

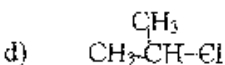
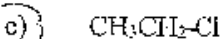
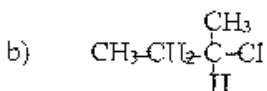
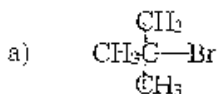
wrong  
eye  
direction -2

Sign Name Kes Print Name Colored  
(1 pt name) (100 pts, 8 pages ÷ scantron sheet)

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
Circle answer on this form for backup to the scantron.

1. Multiple Choice (2 pts each, 24 pts) Choose the one best statement for each question.

1. Choose the primary alkyl halide from the list below



NA = not attempt  
NW = no work

2. The element Ge has how many total number of electrons?

- a) 32 electrons  
b) 4 electrons  
c) 14 electrons  
d) 72 electrons

3. Choose the most electronegative element among the elements shown.

- a) S  
b) Mg  
c) Si  
d) Cl



4. Which of the following bonds is a covalent bond ?
- $\text{Li}_2\text{O}$
  - $\text{SO}_2$
  - $\text{MgCl}_2$
  - $\text{BaO}$
5. Which of the following molecules is unstable with 8 electrons in its valence shell ?
- He
  - S
  - Si
  - N
6. An alkane with 7 carbons is called:
- octane
  - nonane
  - scptane
  - heptane
7. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:
- another hydrogen
  - a nitrogen atom
  - a carbon atom
  - an atom of sulfur
8. According to VSEPR, a molecule with 4 pairs of VSEPR electron pairs around the central atom has:
- tetrahedral geometry,  $109.5^\circ$  angle
  - trigonal planar,  $90^\circ$  angle
  - trigonal bipyramidal,  $120^\circ$  angle
  - octahedral geometry,  $120^\circ$  angle
9. For intermolecular forces the general progression from strongest to weakest intermolecular force is :
- Hydrogen bonding > dipolar > van der Waals
  - Van der Waals > hydrogen bonding > dipolar
  - Dipolar > hydrogen bonding > van der Waals
  - None of the above is correct.

10. The following is a violation of

$\uparrow\downarrow$  \_\_\_\_\_ 2p

$\uparrow\downarrow$  2s

$\uparrow\downarrow$  1s

- a) Aufbau principal
- b) Pauli exclusion
- c) Hund's rule
- d) The electron configuration has no error and violates no rules.

11. Choose the one statement below which is incorrect

- a) p subshell has a maximum of 6 electrons
- b) d subshell has a maximum of 10 electrons
- c) f subshell has a maximum of 14 electrons
- d) all the above statements are true
- e) all of the above statements are false.

12. For the element **P**, circle the one incorrect statement.

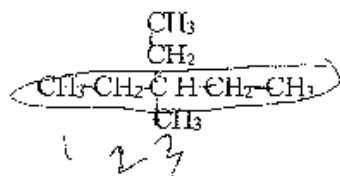
- a) The atomic number is 15
- b) The atomic mass is 30.97
- c) The number of electrons for a neutral atom is 31
- d) The number of valence electrons is 5

II. Short Answers (42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name 3-ethyl-3-methylpentane



pentane

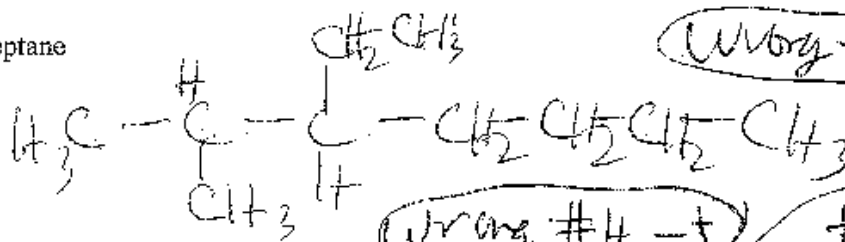
~~ethyl~~ ethyl

methyl

# 1/2 pt

2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

3-ethyl-2-methylheptane



wrong # C = 1/2

wrong # H = 1/2

-1/2 pt each sub

B. Short Answers (36 pts)

1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

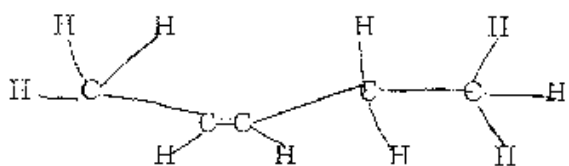
Periodic Table of the Elements

1	H	He																	Li	Be	B	C	N	O	F	Ne
2	Li	Be											B	C	N	O	F	Ne								
3	Na	Mg											Al	Si	P	S	Cl	Ar								
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr								
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe								
6	Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Rn								
7	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr									

(E)

(D)

2. For the following molecule, give a skeletal structure for the given structural formula (line bond structure). (8 pts)

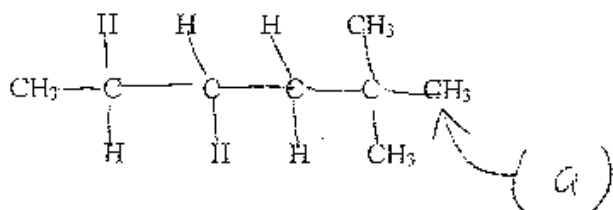


too many C - 4



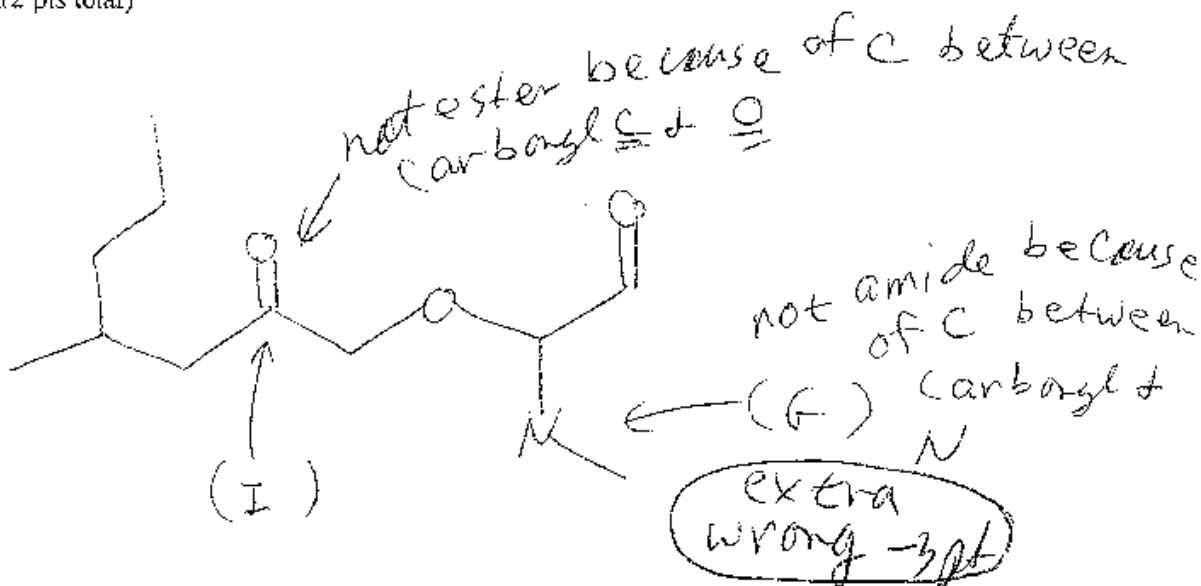
not skeletal - 4 pt

3. For the carbon to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)



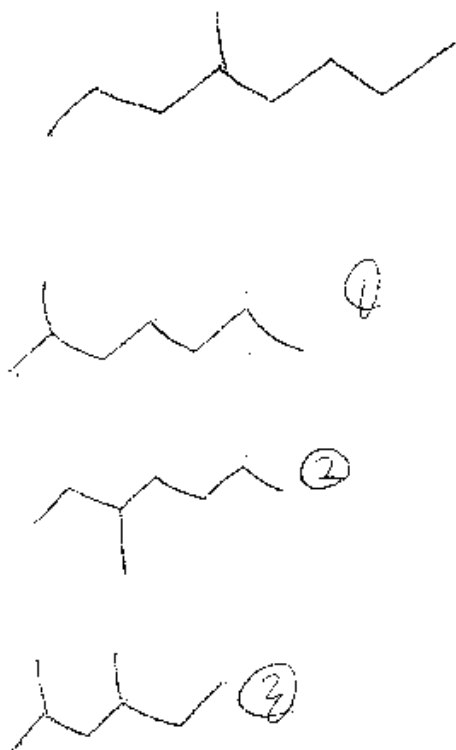
4. Given the following molecule, fill in the parenthesis with the letter of the functional group.

(A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine  
 (H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid  
 anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6  
 pts each, 12 pts total)



Part III. Long Answers (33 pts) Show work where applicable.

I. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts total)

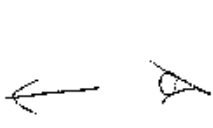
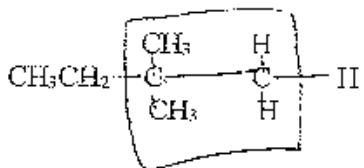


8C

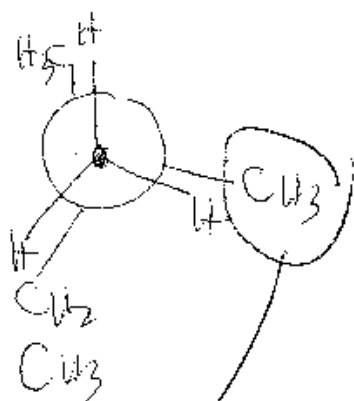
draw  
condensed  
or structural  
w/o energy #  
-2

graded 1+3  
correct

2. For the following molecule, show the correct Newman projection for the highest energy. (15 pts)



between the  
2 circled C  
with the eye  
on the right



each one  
wrong  
-2 x 6 = 12 pt

Energy  
wrong -3 pt

bad  
frame -6 pt

wrong  
eye  
direction -2 pt

N/A = not attempt      NW = no work

Exam I Organic Chemistry I (CHEM 340) Fall 15 Dr. Hahn MW 5 pm Exam # \_\_\_\_\_

Sign Name Key Print Name \_\_\_\_\_  
(1 pt name) (100 pts, 8 pages + scantron sheet)

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
Circle answers on this form for backup to the scantron.

I. Multiple Choice (2 pts each, 24 pts) Choose the one best statement in each question.

1. The element Ge has how many total number of electrons ?

- a) 4 electrons
- b) 14 electrons
- a) 72 electrons
- b) 32 electrons

2. An alkane with 9 carbons is called:

- a) octane
- b) nonane
- c) septane
- d) heptane

3. Choose the <sup>best</sup> ~~one~~ statement ~~below which is incorrect~~

- a) f subshell has a maximum of 14 electrons
- b) p subshell has a maximum of 6 electrons
- c) d subshell has a maximum of 10 electrons
- d) all the above statements are true
- e) all of the above statements are false.

4. The number of valence electrons for the element Sn is

- a) 14 electrons
- b) 3 electrons
- c) 4 electrons
- d) none of the above numbers is the number of valence electrons

5. Choose the largest dipole moment among the bonds shown.

- a) Cl—Cl
- b) N—Cl
- c) C—F
- d) C—Cl

6. Which of the following bonds is an ionic bond ?

- a) NO<sub>2</sub>
- b) K<sub>2</sub>S
- c) CH<sub>4</sub>
- d) I<sub>2</sub>

7. Which of the following molecules is unstable with 8 electrons in its valence shell ?

- a) Si
- b) N
- c) He
- d) S

8. According to VSEPR, a molecule with 4 pairs of VSEPR electron pairs around the central atom has:

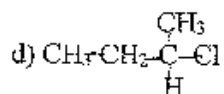
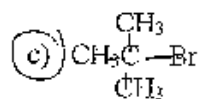
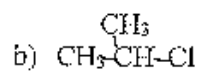
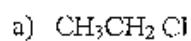
- a) trigonal planar, 90° angle
- b) tetrahedral geometry, 109.5° angle
- c) trigonal bipyramidal, 120° angle
- d) octahedral geometry, 120° angle

9. For intermolecular forces the general progression from strongest to weakest intermolecular force is :

- a) Hydrogen bonding > dipolar > van der Waals
- b) Van der Waals > hydrogen bonding > dipolar
- c) Dipolar > hydrogen bonding > van der Waals
- d) None of the above is correct.



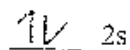
10. Choose the **tertiary** alkyl halide from the list below



11. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:

- a) a carbon atom
- b) an atom of sulfur
- c) another hydrogen
- d) a nitrogen atom

12. The following is a violation of



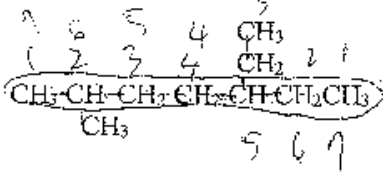
- a) Aufbau principal
- b) Pauli exclusion
- c) Hund's rule
- d) The electron configuration has no error and violates no rules.

II. Short Answers (42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name 5-ethyl-2-methylheptane

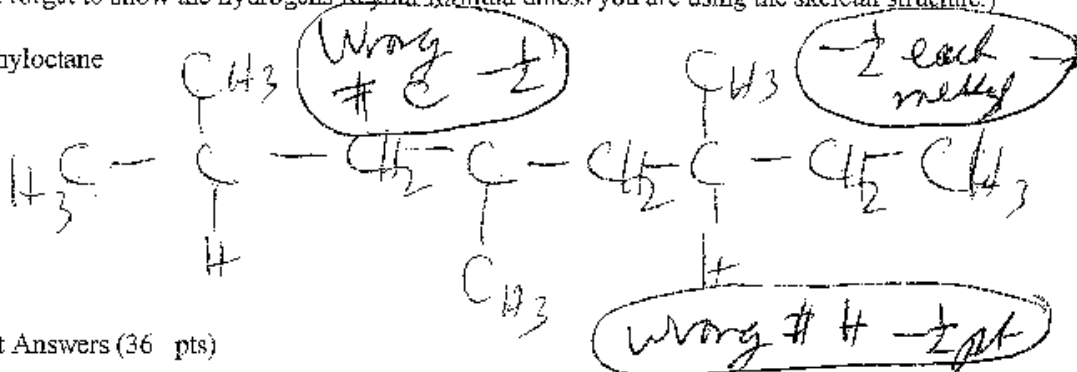


heptane  
5 = ethyl  
2 = methyl

#  $\frac{1}{2}$  pt

2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

2,4,6-trimethyloctane



B. Short Answers (36 pts)

1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

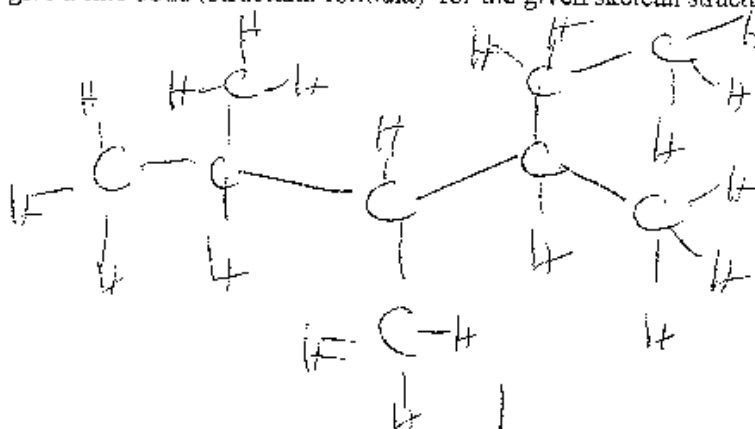
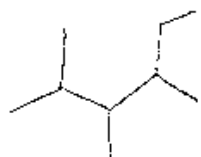
4 pts each

(A)

Periodic Table of the Elements

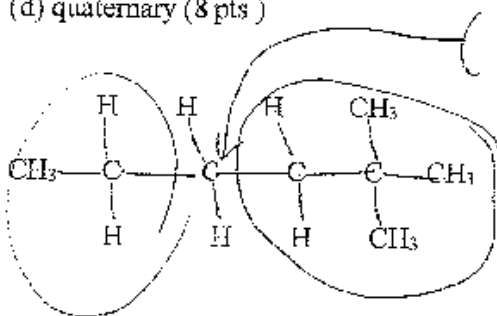
(F) - said p block  $\rightarrow$

2. For the following molecule, give a line bond (structural formula) for the given skeletal structure. (8 pts)



NOT  
line  
bond - 4/8

3. For the carbon (hydrogen) to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)

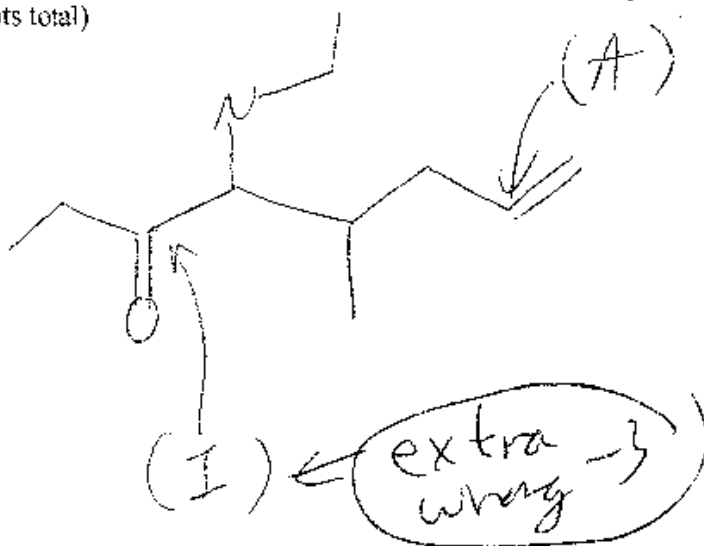


(b)

missing part  
mostly  
correct - 1

4. Given the following molecule, fill in the parenthesis with the letter of the functional group.

(A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine  
(H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid  
anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6  
pts each, 12 pts total)

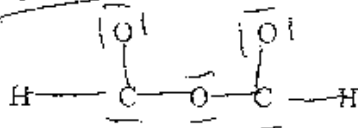


Part III. Long Answers (33 pts) Show work where applicable.

1. Lewis Dot Structure

Draw the Lewis Dot structure of (show all work) (15 pts) (correct electron count is worth 9 pts)  
(molecular formula  $C_2H_2O_3$ )

trial #1



$$16 \times 2 = 32 e^-$$

$$2(\cancel{4}) + 2(1) + 3(6) = 28 e^-$$

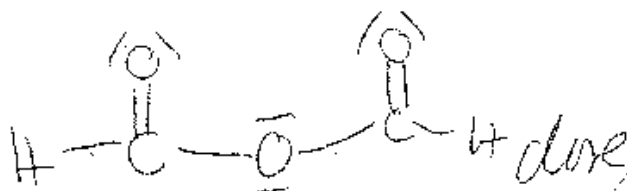
1 pt

2 pt

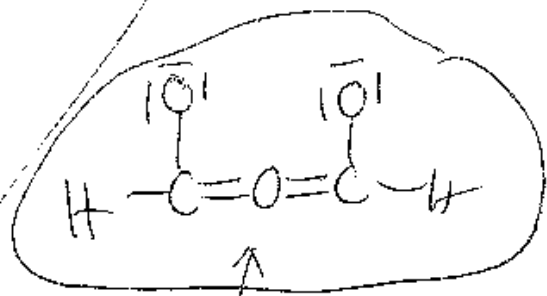
NW = -4 1/2

9 pt

trial #2

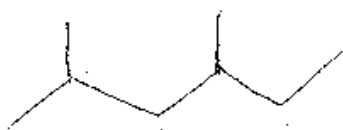


$$14 \times 2 = 28 e^-$$



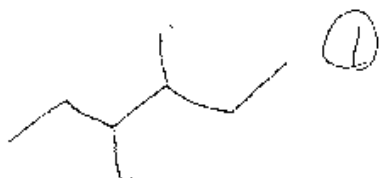
bad but does not violate Lewis rules + correct # e<sup>-</sup> no pts off

2. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts total)

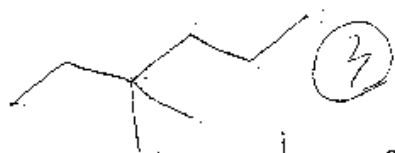


PC

drew  
Condensed or  
Structural w/o  
enough H - 2



Graded 18+3  
Correct



↓ many more

Sign Name \_\_\_\_\_ Print Name \_\_\_\_\_

(1 pt name) (100 pts, 8 pages + scantron sheet)

*white form*

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
Circle answers on this form for backup to the scantron.

1. Multiple Choice (2 pts each, 24 pts) Choose the one best statement in each question.

1. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:

- a) a carbon atom
- b) an atom of sulfur
- c) another hydrogen
- d) a nitrogen atom

2. A molecule with 4 pairs of VSEPR electron pairs around the central atom has:

- a) trigonal bipyramidal,  $120^\circ$  angle
- b) trigonal planar,  $90^\circ$  angle
- c) tetrahedral geometry,  $109.5^\circ$  angle
- d) octahedral geometry,  $120^\circ$  angle

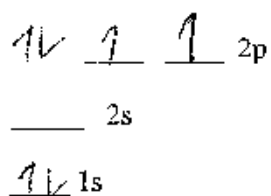
3. For intermolecular forces the general progression from strongest to weakest intermolecular force is :

- a) Hydrogen bonding > dipolar > van der Waals
- b) Van der Waals > hydrogen bonding > dipolar
- c) Dipolar > hydrogen bonding > van der Waals
- d) None of the above is correct.

4. Choose the <sup>best</sup> ~~one~~ statement below which is ~~incorrect~~

- a) p subshell has a maximum of 6 electrons
- b) d subshell has a maximum of 10 electrons
- c) f subshell has a maximum of 14 electrons
- d) all the above statements are true
- e) all of the above statements are false.

5. The following is a violation of



- a) Aufbau principal
- b) Pauli exclusion
- c) Hund's rule
- d) The electron configuration has no error and violates no rules.

6. For the element **P**, circle the one incorrect statement.

- a) The atomic number is 15
- b) The atomic mass is 30.97
- c) The number of electrons for a neutral atom is 31
- d) The number of valence electrons is 5

7. Choose the most electronegative element among the elements shown.

- a) Mg
- b) Si
- c) S
- d) Cl

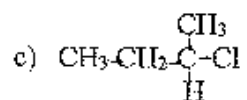
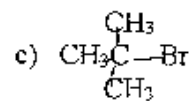
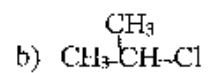
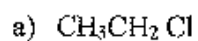
8. Which of the following bonds is a covalent bond ?

- a)  $\text{SO}_2$
- b)  $\text{MgCl}_2$
- c)  $\text{Li}_2\text{O}$
- d)  $\text{BaO}$

9. Which of the following molecules is unstable with 8 electrons in its valence shell ?

- a) He
- b) S
- c) Si
- d) N

10. Choose the primary alkyl halide from the list below



11. The element Ge has how many total number of electrons ?

- a) 4 electrons
- b) 14 electrons
- c) 72 electrons
- d) 32 electrons

12. An alkane with 7 carbons is called:

- a) octane
- b) nonane
- c) septane
- d) heptane



II. Short Answers ( 42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name \_\_\_\_\_



2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

2,3-dimethyldecane

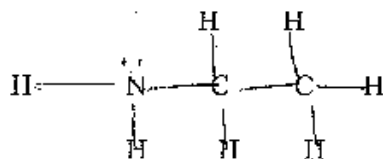
B. Short Answers Part of Short Answers (36 pts)

1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

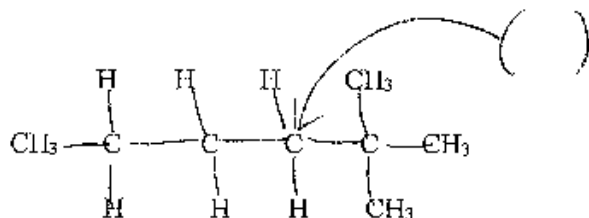
Periodic Table of the Elements

Co	Zn	Sb	Te	Bi	Po	At	Rn	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Mendelevium
108	65	151	128	208	209	210	222	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
11	12	13	14	15	16	17	18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

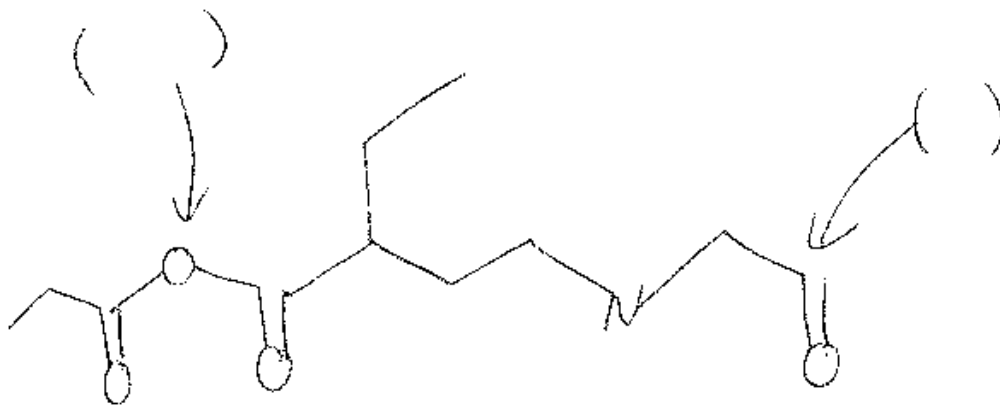
2. For the following molecule, give a condensed structure for the given line bond (structural formula) structure. (8 pts)



4. For the carbon to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)

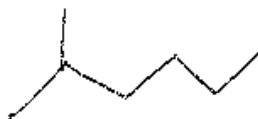


2. Given the following molecule, fill in the parenthesis with the letter of the functional group. (A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine (H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6 pts each, 12 pts total)

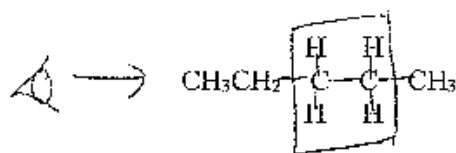


Part III. Long Answers (33 pts) Show work where applicable.

1. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts)



2. For the following molecule, show the correct Newman projection for the lowest energy. (15 pts)



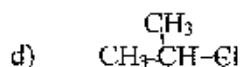
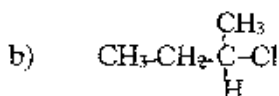
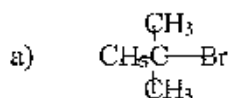
between 2 circled  
C with eye from  
left

Sign Name \_\_\_\_\_ Print Name \_\_\_\_\_  
 (1 pt name) (100 pts, 8 pages + scantron sheet)

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
 Circle answer on this form for backup to the scantron.

I. Multiple Choice (2 pts each, 24 pts) Choose the one best statement in each question.

1. Choose the primary alkyl halide from the list below



2. The element Ge has how many total number of electrons?

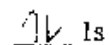
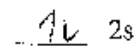
- a) 32 electrons
- b) 4 electrons
- c) 14 electrons
- d) 72 electrons

3. Choose the most electronegative element among the elements shown.

- a) S
- b) Mg
- c) Si
- d) Cl

4. Which of the following bonds is a covalent bond ?
- $\text{Li}_2\text{O}$
  - $\text{SO}_2$
  - $\text{MgCl}_2$
  - $\text{BaO}$
5. Which of the following molecules is unstable with 8 electrons in its valence shell ?
- He
  - S
  - Si
  - N
6. An alkane with 7 carbons is called:
- octane
  - nonane
  - scptane
  - heptane
7. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:
- another hydrogen
  - a nitrogen atom
  - a carbon atom
  - an atom of sulfur
8. According to VSEPR, a molecule with 4 pairs of VSEPR electron pairs around the central atom has:
- tetrahedral geometry,  $109.5^\circ$  angle
  - trigonal planer,  $90^\circ$  angle
  - trigonal bipyrimidal,  $120^\circ$  angle
  - octahedral geometry,  $120^\circ$  angle
9. For intermolecular forces the general progression from strongest to weakest intermolecular force is :
- Hydrogen bonding > dipolar > van der Waals
  - Van der Waals > hydrogen bonding > dipolar
  - Dipolar > hydrogen bonding > van der Waals
  - None of the above is correct.

10. The following is a violation of



- Aufbau principal
- Pauli exclusion
- Hund's rule
- The electron configuration has no error and violates no rules.

11. Choose the one statement below which is incorrect

- p subshell has a maximum of 6 electrons
- d subshell has a maximum of 10 electrons
- f subshell has a maximum of 14 electrons
- all the above statements are true
- all of the above statements are false.

12. For the element **P**, circle the one incorrect statement.

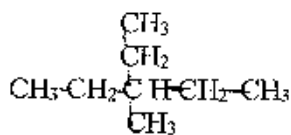
- The atomic number is 15
- The atomic mass is 30.97
- The number of electrons for a neutral atom is 31
- The number of valence electrons is 5

II. Short Answers (42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name \_\_\_\_\_



2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

3-ethyl-2-methylheptane

B. Short Answers (36 pts)

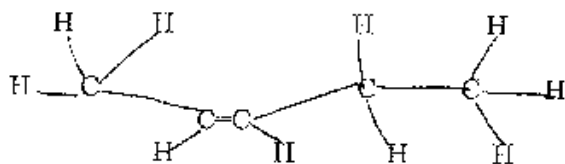
1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

Periodic Table of the Elements

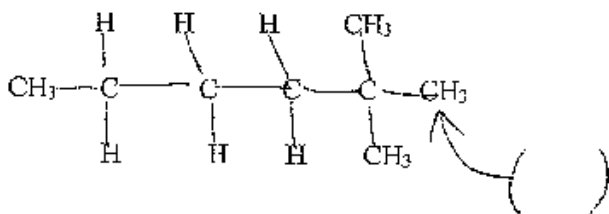
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----



2. For the following molecule, give a skeletal structure for the given structural formula (line bond structure). (8 pts)

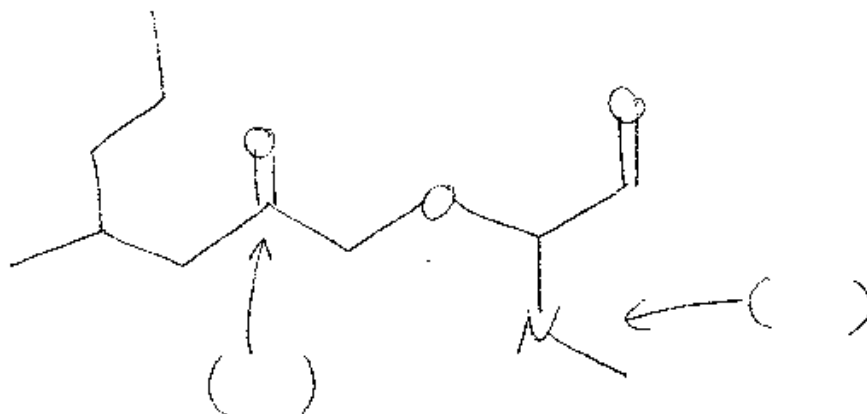


3. For the carbon to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)



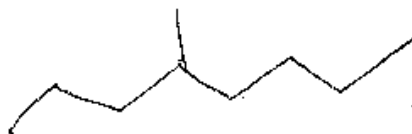
4. Given the following molecule, fill in the parenthesis with the letter of the functional group.

(A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine  
 (H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid  
 anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6  
 pts each, 12 pts total)

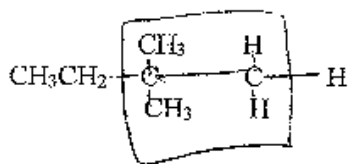


Part III. Long Answers (33 pts) Show work where applicable.

1. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts total)



2. For the following molecule, show the correct Newman projection for the highest energy. (15 pts)



between the  
2 circled C  
with the eye  
on right

Sign Name \_\_\_\_\_ Print Name \_\_\_\_\_

(1 pt name) (100 pts, 8 pages + scantron sheet)

Please show work on all questions for partial credit even on questions which do not specify. Please write legibly. If I cannot read your answer, I cannot grade your answer. (use back of exam for scratch paper)  
Circle answers on this form for backup to the scantron.

I. Multiple Choice (2 pts each, 24 pts) Choose the one best statement in each question.

1. The element Ge has how many total number of electrons?

- a) 4 electrons
- b) 14 electrons
- a) 72 electrons
- b) 32 electrons

2. An alkane with 9 carbons is called:

- a) octane
- b) nonane
- c) septane
- d) heptane

3. Choose the <sup>best</sup> one statement ~~below which is incorrect~~

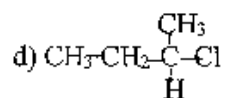
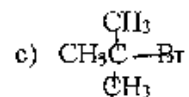
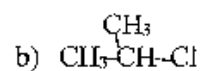
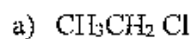
- a) f subshell has a maximum of 14 electrons
- b) p subshell has a maximum of 6 electrons
- c) d subshell has a maximum of 10 electrons
- d) all the above statements are true
- c) all of the above statements are false.

4. The number of valence electrons for the element Sn is

- a) 14 electrons
- b) 3 electrons
- c) 4 electrons
- d) none of the above numbers is the number of valence electrons

5. Choose the largest dipole moment among the bonds shown.
- Cl—Cl
  - N—Cl
  - C—F
  - C—Cl
6. Which of the following bonds is an ionic bond ?
- NO<sub>2</sub>
  - K<sub>2</sub>S
  - CH<sub>4</sub>
  - F<sub>2</sub>
7. Which of the following molecules is unstable with 8 electrons in its valence shell ?
- Si
  - N
  - He
  - S
8. According to VSEPR, a molecule with 4 pairs of VSEPR electron pairs around the central atom has:
- trigonal planar, 90° angle
  - tetrahedral geometry, 109.5° angle
  - trigonal bipyramidal, 120° angle
  - octahedral geometry, 120° angle
9. For intermolecular forces the general progression from strongest to weakest intermolecular force is :
- Hydrogen bonding > dipolar > van der Waals
  - Van der Waals > hydrogen bonding > dipolar
  - Dipolar > hydrogen bonding > van der Waals
  - None of the above is correct.

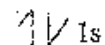
10. Choose the **tertiary** alkyl halide from the list below



11. Hydrogen bonding occurs in molecules in which hydrogen is directly attached to:

- a) a carbon atom
- b) an atom of sulfur
- c) another hydrogen
- d) a nitrogen atom

12. The following is a violation of



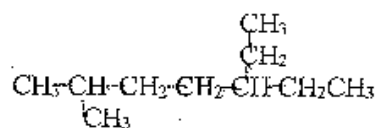
- a) Aufbau principle
- b) Pauli exclusion
- c) Hund's rule
- d) The electron configuration has no error and violates no rules.

II. Short Answers (42 pts)

A. Nomenclature: (2 pts each, 4 pts)

1. Given the structural formula shown below, give the IUPAC name of the molecule.

a. name \_\_\_\_\_



2. Given the following IUPAC name, draw a structural formula of the molecule (skeletal formula acceptable, condensed structure, Lewis Dot structure acceptable, molecular formula not acceptable - don't forget to show the hydrogens in your formula unless you are using the skeletal structure.)

2,4,6-trimethyloctane

B. Short Answers (36 pts)

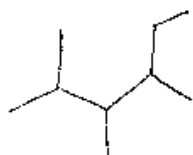
1. Fill in the parenthesis with the letter of the following: (A) s block (B) p block (C) d block (D) f block (E) period (F) group (8 pts)

Periodic Table of the Elements

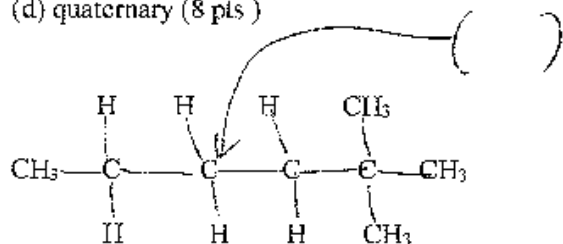
1	2											3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
---	---	--	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tm	Yb	Lu				
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

2. For the following molecule, give a line bond (structural formula) for the given skeletal structure. (8 pts)

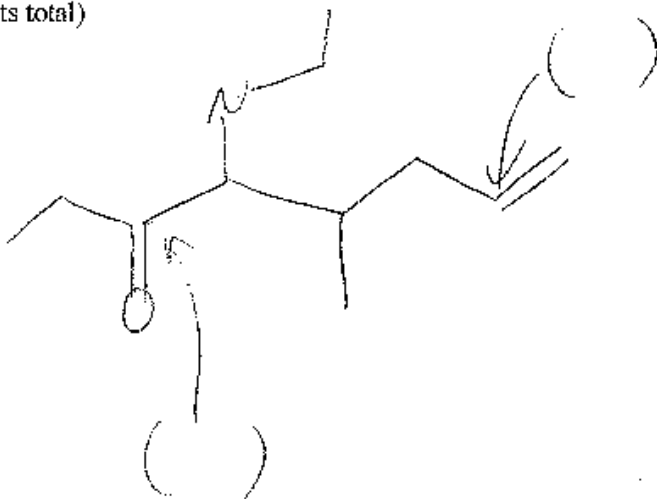


3. For the carbon (hydrogen) to which I drew the arrow, label as (a) primary (b) secondary (c) tertiary (d) quaternary (8 pts)



4. Given the following molecule, fill in the parenthesis with the letter of the functional group.

(A) alkene (B) alkyne (C) arene (D) alkyl halide (E) alcohol (F) ether (G) amine  
 (H) aldehyde (I) ketone (J) carboxylic acid (K) ester (L) amide (M) acid halide (N) acid  
 anhydride (You may use all the letters or none of the letters and may use the same letter multiple times) (6  
 pts each, 12 pts total)

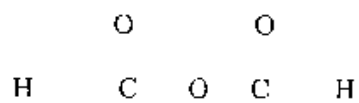




Part III. Long Answers (33 pts) Show work where applicable.

1. Lewis Dot Structure

Draw the Lewis Dot structure of (show all work) (15 pts) (correct electron count is worth 9 pts)  
(molecular formula  $\text{C}_2\text{H}_2\text{O}_3$ )



2. Given the following molecule, show at least 3 structural (constitutional) isomers (6 pts each, 18 pts total)

