

General Instructions: Read each question carefully and follow directions. For multiple choice problems, write the letter in the space provided. If you need a calculator, pencil, eraser, more paper, etc., ask.

## A. Definitions (2 pts each)

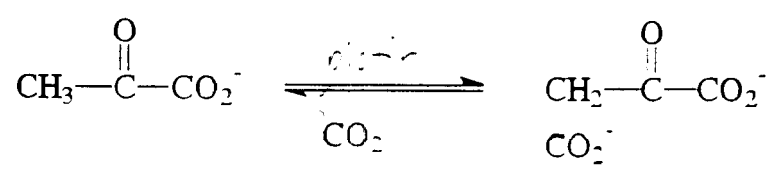
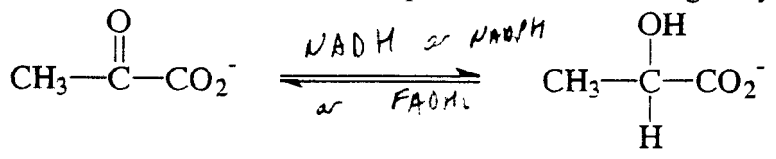
1. peptide bond is an amide linkage between an  $\alpha$ -amino group and an  $\alpha$ -carboxy group.
2. Denaturation- change in protein 2<sup>o</sup> 3<sup>o</sup> or 4<sup>o</sup> structure by heat, chemicals, etc
3. enzyme is a highly specific protein catalyst.
4. Allosteric enzyme- enzyme with 2<sup>nd</sup> site for substrate or other molecule to bind
5. proenzyme is an enzyme formed as a longer precursor and cleaved into an active state.
6. Substrate- reactant of enz. catalyzed rxn
7. active site is the region of an enzyme where substrate is converted to product.
8. Inhibitor- molecule that slows down rate of enz. catalyzed rxn
9. Replication is when DNA is copied for cell division.
10. Nucleotide- base + pentose + phosphate
11. Gene- region of DNA coding for a protein
12. Translation is when genetic information is translated into protein sequence.
13. Codon- set of 3 nucleotides of mRNA that code for an amino acid
14. Coenzyme- organic molecule req'd for enz. catalyzed rxn

B. Concepts and Applications of Concepts

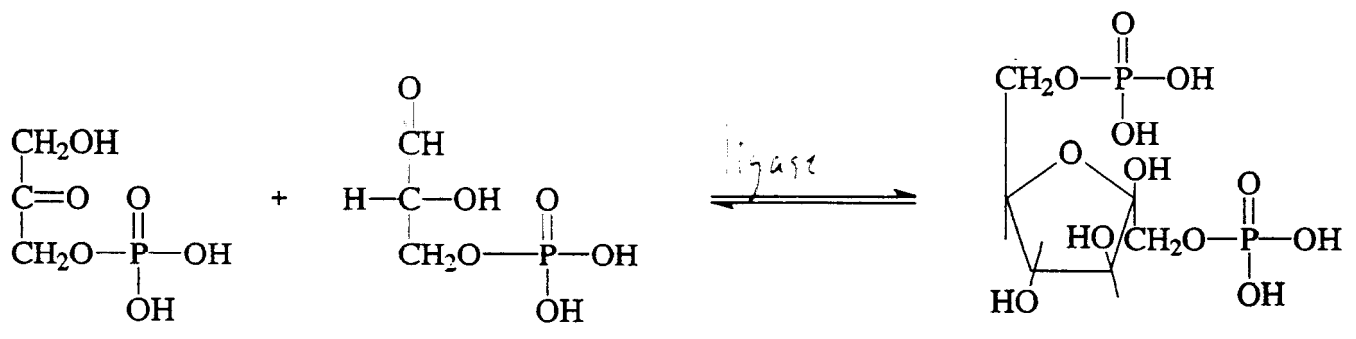
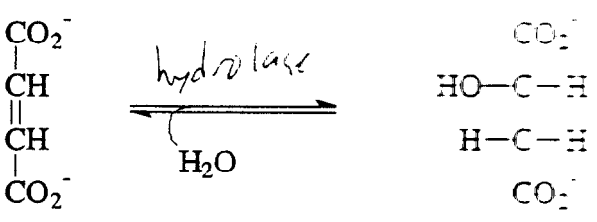
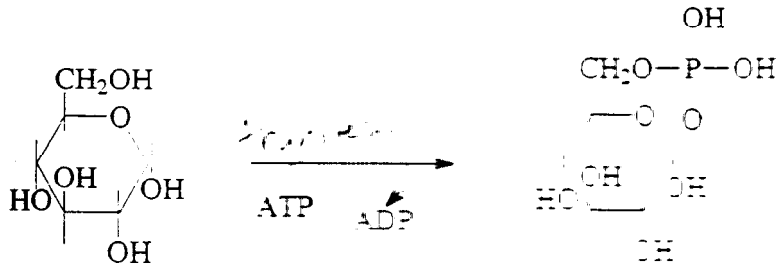
1. Construct a table demonstrating the similarities and differences between RNA and DNA. (10 pts)

	RNA	DNA
sugar	ribose	deoxyribose
# strands	ss	ds
bases	U	T
bases	AGC	AGC
	3 types	1 type

2. What coenzymes would be required in the following enzyme-catalyzed reactions? (6 pts)



3. What class of enzyme catalyzes the following reactions? (9 pts)

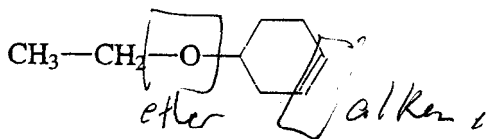
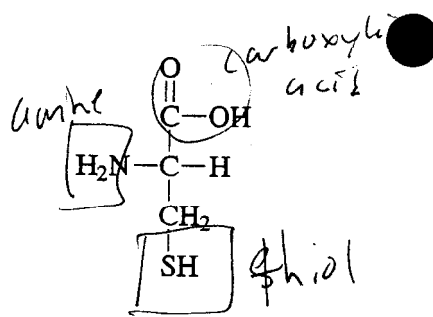
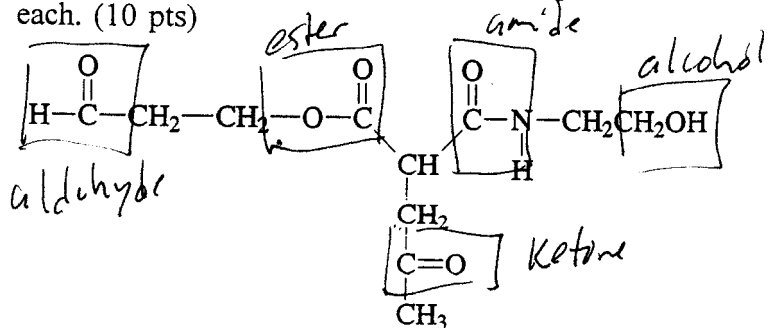


25 pts

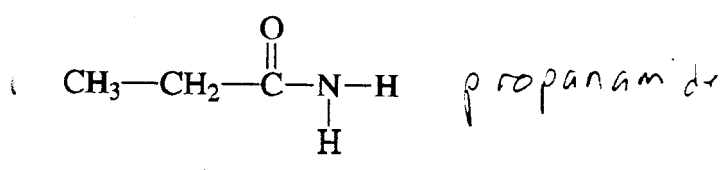
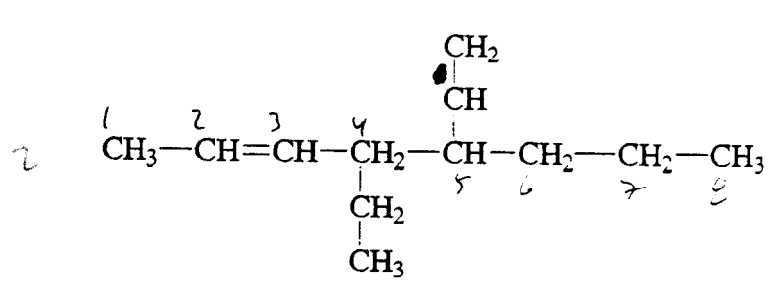
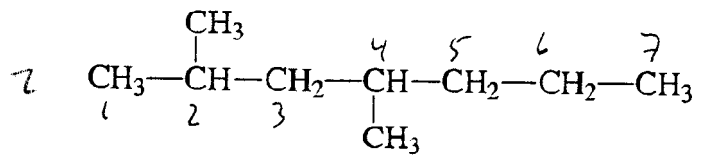


Part A

1. Draw a box around each functional group in the following molecules and indicate the identity of each. (10 pts)

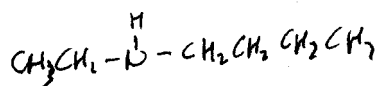


2. Give the IUPAC name of the following molecules. (5 pts)

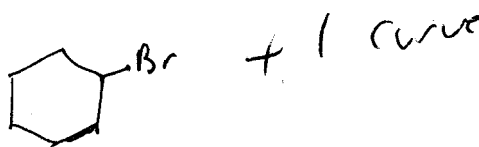


3. Draw the structure of the following molecules, for which the IUPAC name is given. (5 pts)

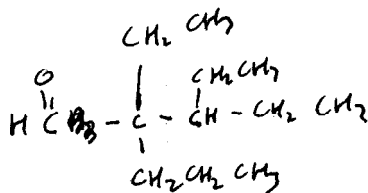
ethyl butyl amine



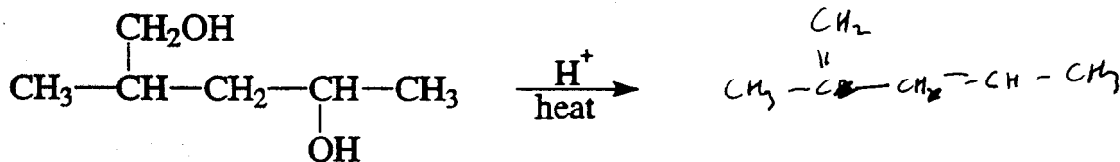
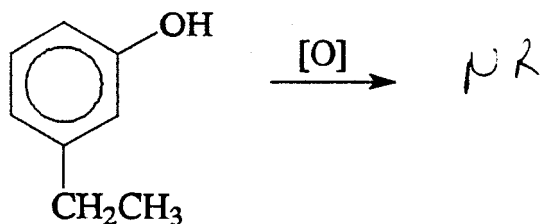
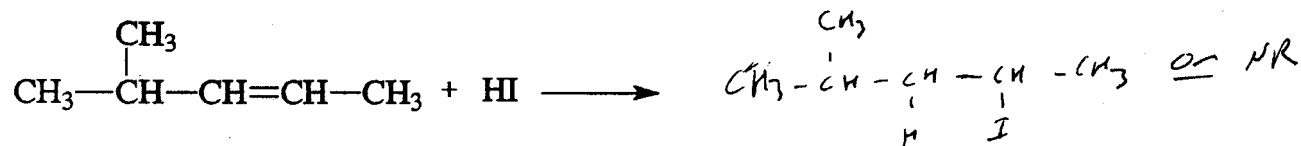
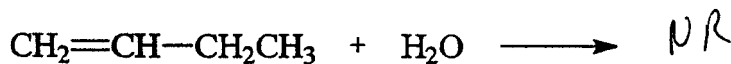
3-bromocyclohexane



2-propyl-2,3-diethylpentanal

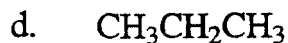
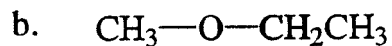
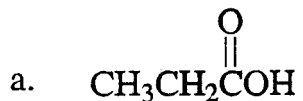


4. Predict the predominant product of the following reactions. (10 pts)



Part B. Multiple choice (2 pts each)

1. Of the following molecules, the one with the highest boiling point would be A.



2. The indicated bond is best characterized as C.



+ 2  $\pi$  bond

a. a sigma ( $\sigma$ ) bond

b. a pi ( $\pi$ ) bond

c. both a  $\sigma$  and a  $\pi$  bond

d. neither a  $\sigma$  nor a  $\pi$  bond

3. The carbon in the molecule  $\text{CH}_4$  is C.

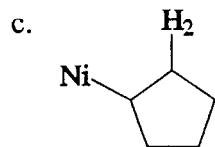
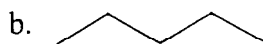
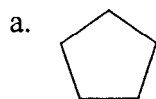
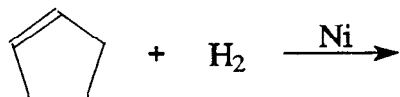
a. an sp hybrid

b. an  $\text{sp}^2$  hybrid

c. an  $\text{sp}^3$  hybrid

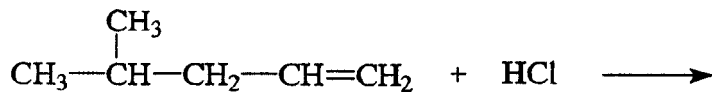
d. an  $\text{sp}^4$  hybrid

4. The product of the following reaction is A.



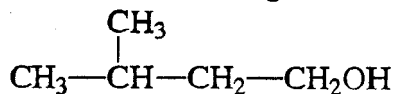
d. no reaction occurs

5. The predominant product of the following reaction is C.



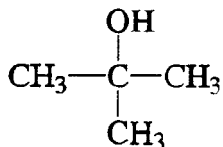
- a.  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}-\text{CH}_2 \\ | \quad | \\ \text{HCl} \quad \text{HCl} \end{array}$       b.  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_2\text{Cl} \end{array}$
- c.  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}-\text{CH}_3 \\ | \\ \text{Cl} \end{array}$       d. no reaction occurs

6. The IUPAC name of the following molecule is B.



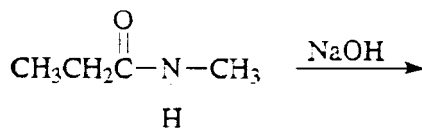
- a. 2-methyl-butanol      b. 3-methyl-1-butanol
- c. 2-methyl-4-butanol      d. methyl-methyl-propanol

7. If the following molecule was dehydrated, the product would be B.



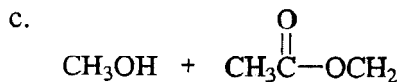
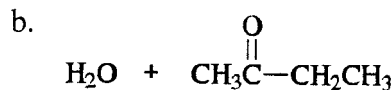
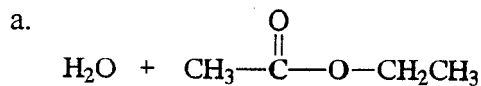
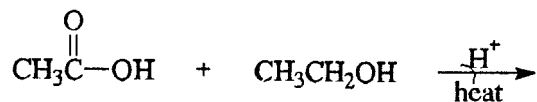
- a. an alkane      b. an alkene
- c. an alkyne      d. the reaction would not occur

8. The products of the following reaction would be C.



- a.  $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3\text{CH}_2\text{COH} \end{array} + \begin{array}{c} \text{CH}_3-\text{N}-\text{Na} \\ | \\ \text{H} \end{array}$       b. the reaction would not occur
- c.  $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3\text{CH}_2\text{C}-\text{ONa} \end{array} + \begin{array}{c} \text{CH}_3\text{NH} \\ | \\ \text{H} \end{array}$       d.  $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3\text{CH}_2\text{CONa} \end{array} + \begin{array}{c} \text{CH}_3\text{N}-\text{Na} \\ | \\ \text{H} \end{array}$

9. The products of the following reaction would be A.



10. In the Tollens test,  $\text{CH}_3\text{CH}_2\text{OH}$  would give B.

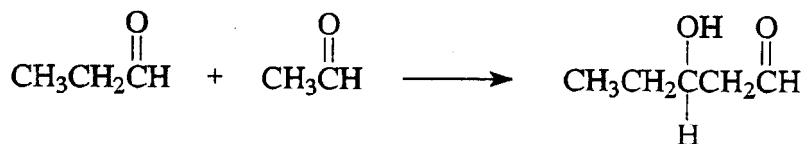
a. a positive reaction

b. a negative reaction

c. no clue

d. who cares?

11. The reaction



is C.

a. an ester formation

b. an amide formation

c. an aldol condensation

d. an acetal condensation

12.  $\text{CH}_3\overset{\text{CH}_3}{\underset{\text{CH}_3\text{CH}_2\text{CH}_3}{\text{C}}}$  and  $\text{CH}_3\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_3$  are C.

a. epimers

b. anomers

c. isomers

d. diastereomers

13. Of the following, which reaction does not occur with a tertiary alcohol? B.

a. dehydration

b. oxidation

c. ester formation

d. alkene formation



18.  $\alpha$  maltose is B.

- a. a disaccharide of galactose and glucose
- c. a monosaccharide

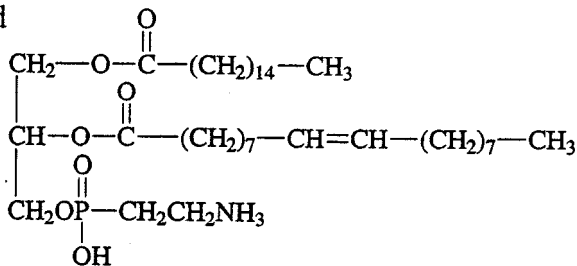
- b. a disaccharide of glucose
- d. a polysaccharide

19. Chitin is D.

- a. a disaccharide of glucose
- c. a polysaccharide of glucose

- b. a disaccharide of N-Acetyl-glucosamine
- d. a polysaccharide of N-Acetyl-glucosamine

20. The phospholipid



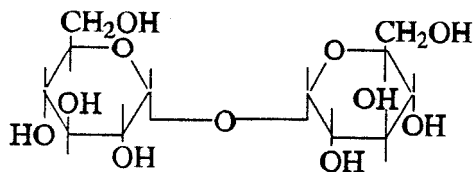
is composed of D.

- a. stearic acid, oleic acid, glycerol and choline
- b. palmitic acid, oleic acid, glycerol and choline
- c. stearic acid, oleic acid, glycerol and ethanolamine
- d. palmitic acid, oleic acid, glycerol and ethanolamine

21. The essential fatty acids are A.

- a. linoleic acid, linolenic acid and arachidonic acid
- b. stearic acid, palmitic acid and oleic acid
- c. oleic acid, palmitoleic acid and stearic acid
- d. all of the above

22.

is   f  .

a. a reducing sugar

b. a non reducing sugar

c. a glycoside

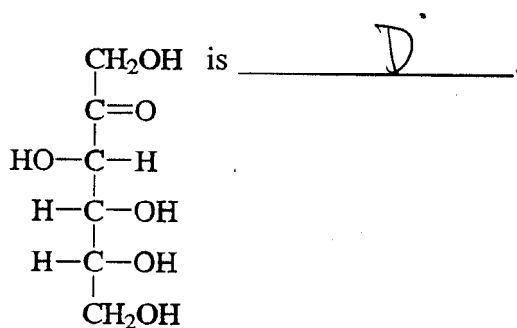
d. an  $\alpha$  sugar

e. a and d

f. b and c

g. a and c

23.



1. an aldose

2. a ketose

3. a hexose

4. a pentose

5. a D sugar

6. an L sugar

a. 1, 3 and 5

d. 2, 3 and 5

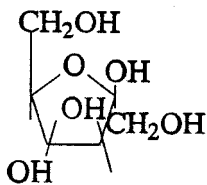
b. 1, 4 and 5

e. 2, 4 and 6

c. 1, 4 and 6

f. 2, 3 and 6

24.

is   c  .a.  $\alpha$ -D-glucoseb.  $\alpha$ -D-fructosec.  $\beta$ -D-fructosed.  $\beta$ -D-Glucose

25.  $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{C}-\text{NH}_2$  is A.

- a. butanamide  
b. propanoic acid  
c. butanoic acid  
d. propyl ester

26. In water,  $\text{CH}_3(\text{CH}_2)_8\overset{\text{O}}{\parallel}\text{C}-\text{OH}$  is D.

- a. soluble at all pH's  
b. insoluble at all pH's  
c. soluble at pH 2 but not at 10  
d. soluble at pH 10 but not at 2

27.  $\text{CH}_3\text{CH}_2\overset{\text{O}}{\parallel}\text{C}-\text{OCH}_2\text{CH}_3$  is D.

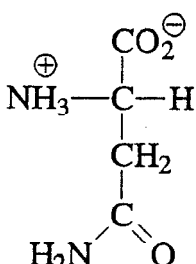
- a. ethyl propyl ester  
b. ethyl ethanoate  
c. propyl ethanoate  
d. ethyl propanoate

28.  $\text{CH}_3(\text{CH}_2)_{14}\overset{\text{O}}{\parallel}\text{C}-\text{O}-(\text{CH}_2)_{29}\text{CH}_3$  is C.

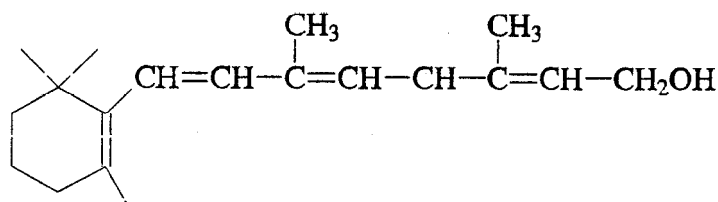
- a. a polysaccharide  
b. an amino acid  
c. a wax  
d. a triglyceride



32.  $\text{CH}_3(\text{CH}_2)_{16}\text{CO}_2^\ominus$  is D.
- a. palmitic acid      b. palmitoleic acid  
c. oleic acid      d. stearic acid

33.  is C.

- a. lysine      b. methionine  
c. asparagine      d. glutamine

34.  is A.

- a. vitamin A      b. vitamin D  
c. vitamin C      d. vitamin K

35.  $\text{CH}_3\underset{\text{NH}_2}{\text{CH}}\text{CH}_2\text{CH}_3$  is F.

- a. a secondary amine      b. a primary amine  
c. 2-aminobutane      d. 3-aminobutane  
e. a and d      f. a and c  
g. b and c      h. b and d