University of Tanta
Faculty of Pharmacy

Pharmaceutical Chemistry Department
First Level – PharmD – Clinical

Pharmaceutical Organic Chemistry (PC101) Final Examination

Sun. 28/02/2021 - 9:30 AM Time Allowed: 120 minutes Total: 50 points

Question#I (17 Points, 40 minutes)

Select the **ONE best answer** by encircling the appropriate letter (a-e), and then fill the **Answer Sheet for Q # I**

	a	b	c	d	e
1					
2					
3					
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10					
11					
12					
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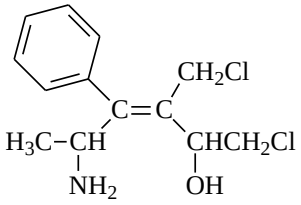
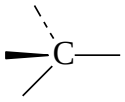
17					



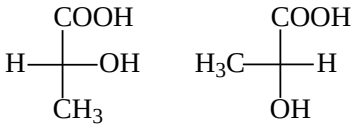
(I)



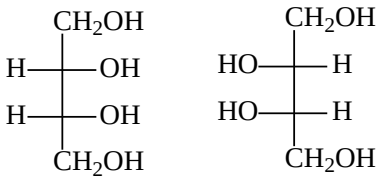
(II)

1) **(I)** is
   a) (Z)-alkene
   b) (E)-alkene
   c) None

2) Formula **(II)** is
   a) Top view
   b) Side view
   c) Front view
   d) Both (a) and (b)
   e) None



(III) **(IV)**

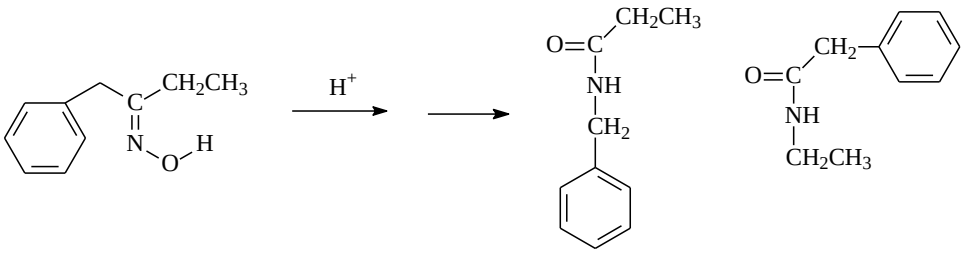


(V) **(VI)**

3) **(III)** and **(IV)** are
   a) The same compound
   b) Enantiomers
   c) Diastereomers
   d) None

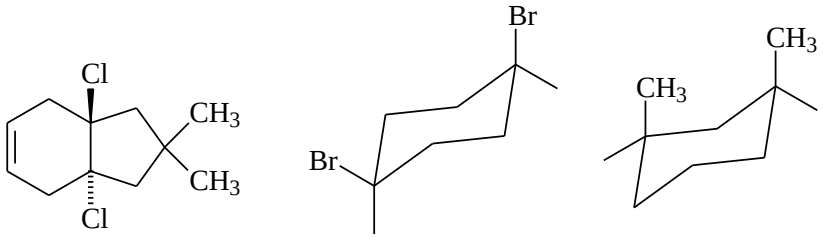
4) The configuration of **(III)** is
   a) (*R*) configuration b) (*S*) configuration

5) **(V)** and **(VI)** are superimposable mirror images
   a) True b) False



(A) **(B)**

6) The above reaction gives
   a) **(A)** only
   b) **(B)** only
   c) A mixture of **(A)** and **(B)**
   d) None



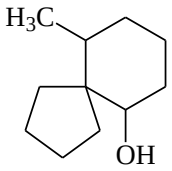
(VII) **(VIII)** **(IX)**

7) **(VII)** has how many chiral centers?
   a) Zero b) One c) Two d) Three

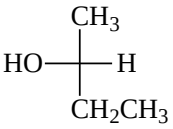
8) **(VIII)** has
   a) One chiral center
   b) Two chiral centers
   c) None

9) **(IX)** has
   a) No chiral center
   b) One chiral center
   c) Two Chiral centers
   d) None

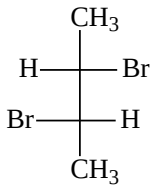
10) Which is **not** correct concerning SN_1 reaction?
   a) It leads to racemization
   b) Rearrangement is possible
   c) It is one-stage process
   d) One molecule is undergoing covalency change
   e) None



(X)



(XI)

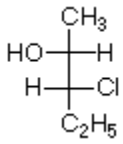


(XII)

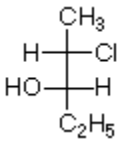
11) The IUPAC name of **(X)** is
   a) 9-Methyl spiro[5.4]decan-5-ol
   b) 5-Methyl spiro[5.4]decan-9-ol
   c) Both (a) and (b)
   d) None

12) Comound **(XI)** is
   a) *R* b) *S*

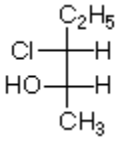
13) Compound **(XII)** is
   a) 2S, 3R b) 2R, 3S c) 2R, 3R d) 2S, 3S



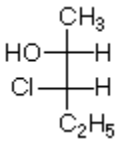
(A)



(B)



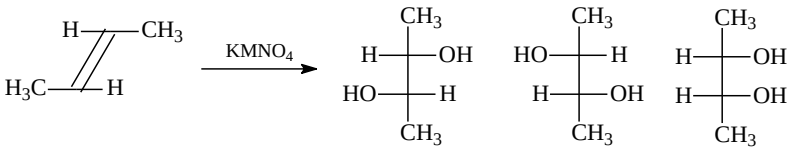
(C)



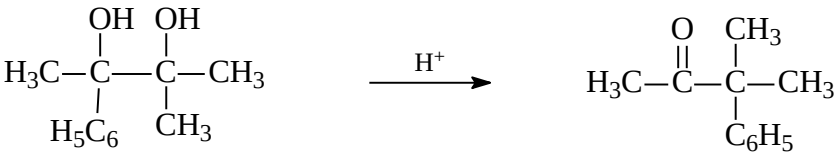
(D)

14) Which two of the above Fischer formulas represent a pair of enantiomers?
   a) A and B
   b) C and D
   c) A and D
   d) B and C
   e) None

15) In E_2 reaction, *erythro* compound gives
   a) *Z* alkene only b) *E* alkene only
   c) Mixture of *Z* and *E* alkenes



16) The above reaction gives
   a) Only (A)
   b) Only (B)
   c) Only (C)
   d) A mixture of (A) and (B)
   e) All are possible



(XIII)

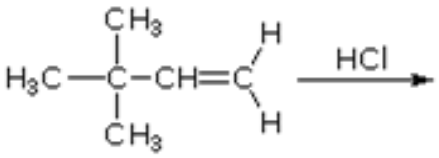
17) **(XIII)** is the only possible product of the above reaction
   a) True b) False

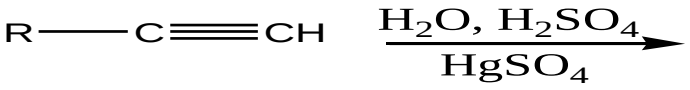
Question # II (17 points, 40 min)

I) Draw chemical structures of the following compounds: (2 points, 6 min.)

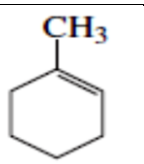
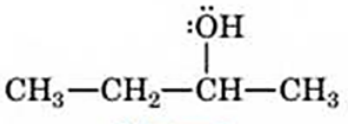
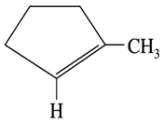
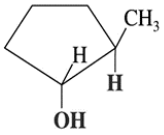
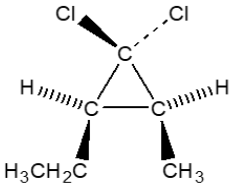
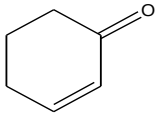
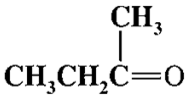
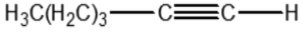
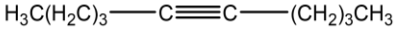
i) 1,5- dimethylcyclopentene ii) ٥,8-dimethyl-7-nonen-1-yne

II) Complete and Write the mechanism of the following reactions? (6 points)





III) Complete the following table by drawing chemical structures of reactants, reagents or products as indicated in each case only in the provided space? (9 points, 12 min)

Reactants	Reagents	Products
	HCl	……+……
	H_2SO_4	…… + ……
	1) …… 2) ……	
……	1) …… 2) ……	
	H_2/Pd, C Ethanol	……
……	1) KMnO4, $^-$OH 2) Heat 3) H_3O^+	 **+ CO_2 + H_2O**
	1) …… 2) ……	

Question #III Answer the following in the provided space (16 points, 40 minutes)

***Examine the following alkyl halides, then answer questions 1-4 (2 points)**

$CH_3CH_2CH_2CH_2Br$, $(CH_3)_2CHCH_2Br$, $(CH_3)_3CBr$, $CH_3CH_2CH(Br)CH_3$

(I) **(II)** **(III)** **(IV)**

1) Compound (**IV**) is classified as …….. alkyl halide.

A) primary B) secondary C) tertiary D) quaternary

2) The most likely compound to undergo nucleophilic substitution via S_N1 mechanism is ……

A) **(I)** B) **(II)** C) **(III)** D) **(IV)**

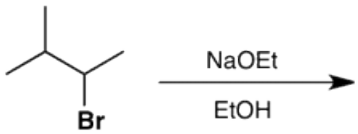
3) The most likely compound to undergo nucleophilic substitution via S_N2 mechanism is …….

A) **(I)** B) **(II)** C) **(III)** D) **(IV)**

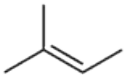
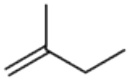
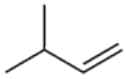
4) Compound (III) can react with a strong base to form an alkene via elimination mechanism.

A) True B) False

***Examine the following reaction, then answer questions 5-8 (4 points)**



5) Which is the main elimination product of the reaction?

A)  B)  C) 

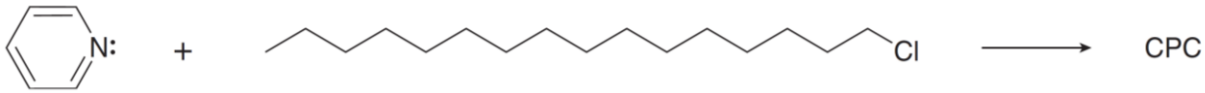
6) Outline the most likely mechanism:

7) Rate equation:

8) Energy Diagram:

***Examine the following reaction, then answer questions 9-11 (3 points)**

CPC (cetylpyridinium chloride), an antiseptic found in throat lozenges and mouthwash, is synthesized by the following reaction.



Pyridine alkyl chloride

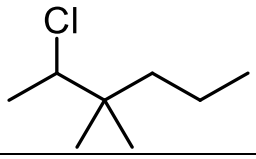
9) Draw the structure of CPC.

10) The IUPAC Name of the alkyl chloride in the reaction is:

11) The most likely mechanism of the reaction is

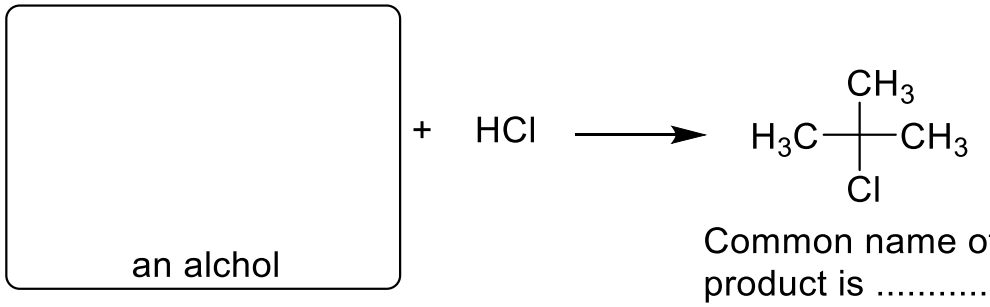
A) S_N1 B) S_N2 C) E1 D) E2

***Apply IUPAC nomenclature rules to complete the missing in questions 12-14, Remember to number the structures (3 points)**

	Structure	IUPAC name
12)		1,3-dibromo-5-methylcyclohexane
13)		
14)		3,3-Dichloro-2-methylhexane

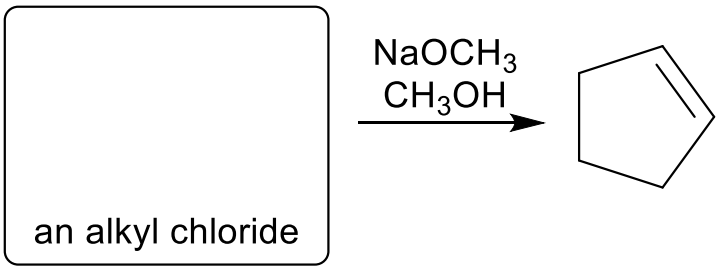
***In questions 15-18, complete the missing in each of the reactions (4points)**

15)



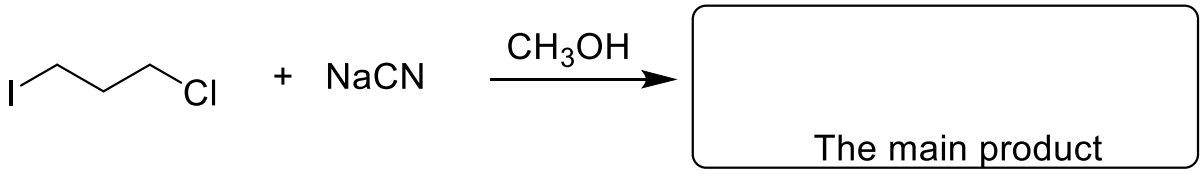
Common name of the product is .....

16)



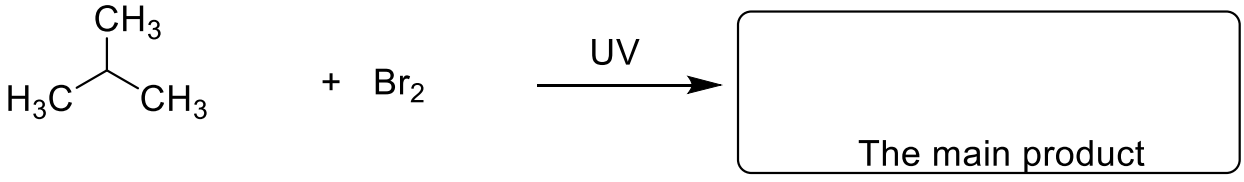
The most likely mechanism of the reaction is .....

17)



which one halide group, (I^-) or (Cl^-), will be a better leaving group?

18)



The Mechanism of the reaction is called .....

Best Wishes