Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

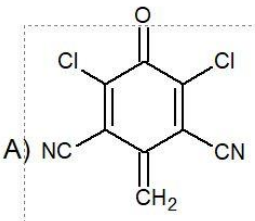
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

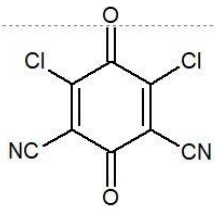
Course: Spectroscopy of Organic Compounds **Semester: II**
Program: M Tech- Sc. **Time 03 hrs.**
Course Code: CHEM7009 **Max. Marks: 100**

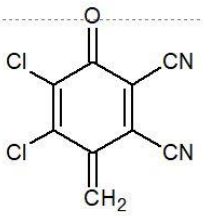
Instructions: Attempt All Questions.

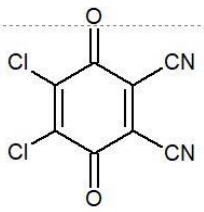
PART A

1) In hydroboration:
   A) Borane is lewis acid and alkene is lewis base
   B) Borane is lewis base and alkene is lewis acid
   C) There is no lewis acid base in the reaction
   D) Difficult to predict
2) The Sharpless epoxidation is an organic reaction used to steroselectively convert
   A) A ketone to aldehyde
   B) An allylic alcohol to epoxy alcohol
   C) Vinylic alcohol to epoxy alcohol
   D) Epoxy alcohol to aldehyde
3) Selenium dioxide can be used for the following except
   A) Oxidation of Allylic and Benzylic methylene group
   B) Oxidation of alkyne
   C) Allylic epoxidation
   D) Allylic hydroxylation
4) Thallium nitrate is
   A) A Lewis base reducing agent
   B) A lewis acid oxidizing agent.
   C) It is nucleophilic
   D) Results in oxidation of Tl(I) to Tl(III)
5) di-isopinocampheylborane and mono isopinocampheylborane are
   A) epoxidizing agent
   B) hydroborating reagent
   C) derivatives of LiAlH4
   D) None of the above
6) What is the correct structure of DDQ?

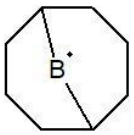
A) 

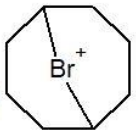
B) 

C) 

D 

7) The correct structure of 9-BBN is

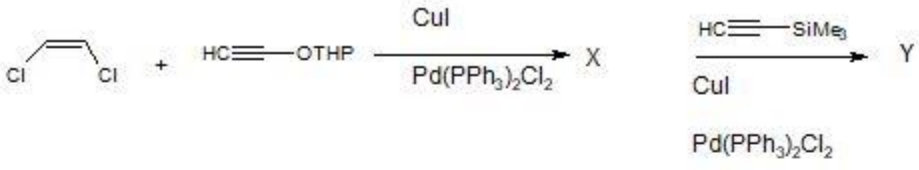
A) 

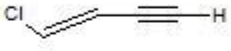
B) 

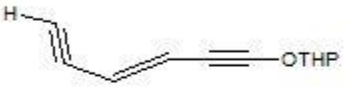
C) 

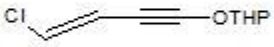
D 

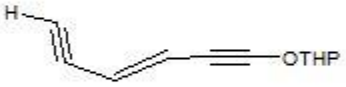
8) Identify X and Y in the following reaction:

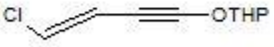


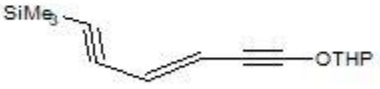
A) X: 

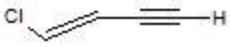
Y: 

B) X: 

Y: 

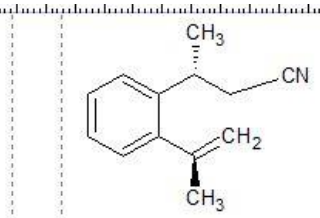
C) X: 

Y: 

D)X: 

Y: 

9) Identify the product of the following reaction:

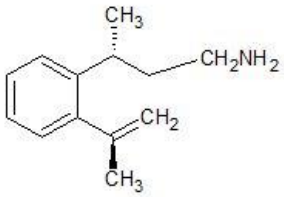


DIBAL-H

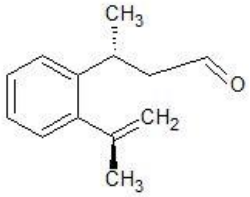
Hexane, -70 ^{0}C

?

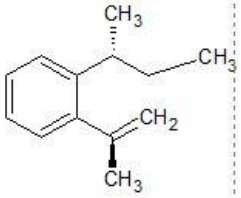
A)



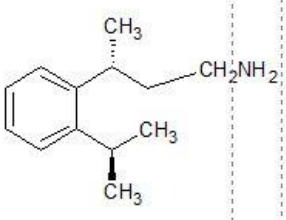
B)



C)



D)

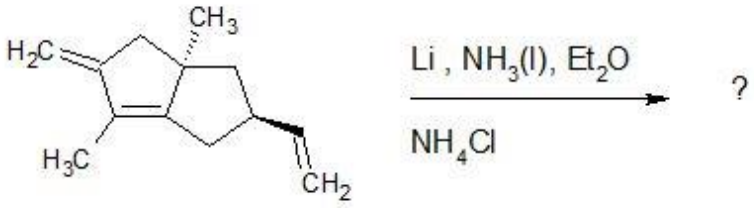


10)

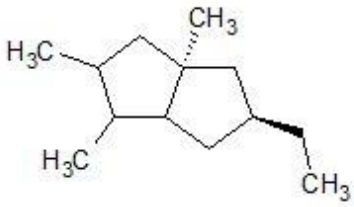
Match the following:

a) Sonoghashira reaction	I) organotin compounds
b) Suzuki reaction	II) Pd(Cat), Cu (Catalyst)
c) Stille reaction	III) unsaturated alkyl halide, alkene . Pd(Cat)
d) Heck reaction	IV) boronic acid and organo halide

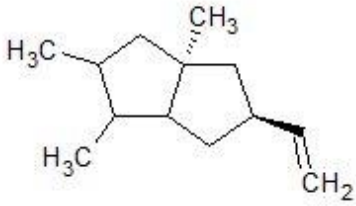
11) Identify the structure of the product of the following reaction



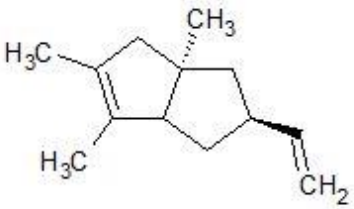
A)



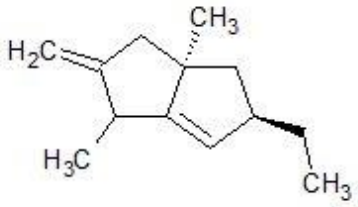
B)



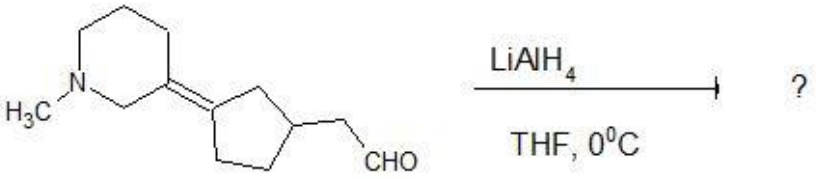
C)



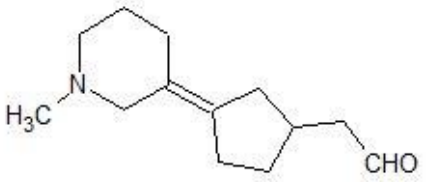
D)



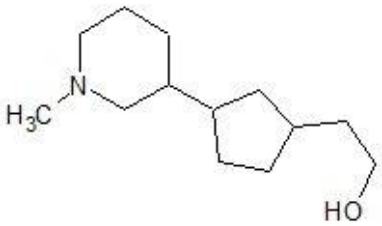
12) Choose the correct product of the following reaction



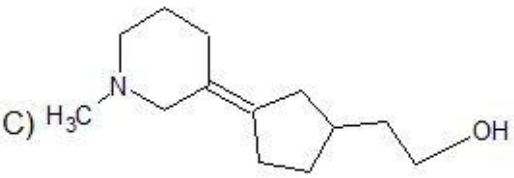
A)



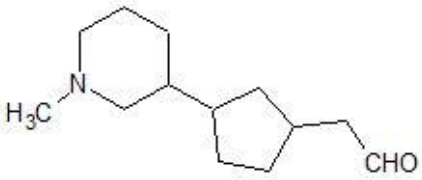
B)



C)



D)



13) How many signals does the aldehyde ($CH_3)_3CH_2CH_2CHO$ have in Proton NMR and ^{13}CNMR

A) Five ^{1}H signals and Five ^{13}C signals

B**)** Four ^{1}H signals and Five ^{13}C signals

C) Five ^{1}H signals and Four ^{13}C signals

D) None of These

14) Of the following statements, which are True regarding Mass spectrometry

A) Structurally isomeric alkanes can be distinguished by low resolution mass spectrometry

B) The molecular ion of carbonyl compounds with – C-H readily undergoes elimination of an alkene to give a relatively stable enol radical cation

C) The base peak of simple Ketone attributed to acylium ion

D) The most weak peak is due to stable, charged species produced by allylic cleavage

15) Which of the following compounds would be expected to show only a single peak in PMR spectrum

(A**)** Acetone and Methyl iodide

(B) Dimethyl ether and Dibromomethane

(C) Chloro bromo methane and 1,2-Dibrome ethane

(D) Acetone and Acetaldehyde

16) Which of the following indicates the multiplicities for Hydrogen C1, C3, C4 and C5 of Pent-2-one attribute to spin-spin coupling in its PNMR

(A) Hs on C1, doublet, C3, Singlet, C4, triplet, C5, Singlet

(B**)** Hs on C1, Singlet, C3, Triplet, C4, multiplets, C5, Triplet

(C) Hs on C1, Singlet, C3, Triplet, C4, Sextet, C5, Triplet

(D) Hs on C1, Singlet, C3, Triplet, C4, quartet, C5, Triplet

17). An organic compound with molecular formula C6H12O gives a positive iodoform test

IR: 2950-2840 cm^{-1}, 1710 cm^{-1}

NMR: (i) δ2.1 (Singlet, 8.5 squares) (ii) δ1.1 (Singlet, 25.8 squares). What will be the compound

(A) 2- Methyl pentaldehyde

(B) 3,3 – Dimethyl but-2-one

(C) Hex-3-one

(D) 4-methyl Pent-2-one

18). What will be the structure of the compound whose peaks in the mass spectrum have m/z values 57 (100% abundance), 41, 29 and 27

(A) Propanol

(B) Acetone

(C) Tertiary butyl alcohol

(D) But-2-one

!9) What will be m/z values obtained during the fragmentation of Benzadehyde

(A) 105, 77, 50

(B) 76, 105, 51

(C) 76, 105, 50

(D) 105, 77, 51

20) What will be number of unsaturation in C_6H_6ONCl?

(A) 0

(B) 2

(C) 4

(D) 3

21). Which statement is false regarding HETCOR?

(A) Quaternary Carbons are visible to the technique

(B) There is no diagonal spectrum in the X-Y field as is so with COSY experiment

(C) A ^{13}C spectrum is illustrated along one axis and ^{1}H spectrum on the other

(D) All of these

22). What is the correct statement for Spin-spin splitting?

(A) magnetic coupling is the interaction of the electric fields of two or more nuclei

(B**)** magnetic coupling is the interaction of the magnetic fields of two or more nuclei

(C) It is the interaction of the magnetic and electric fields both

(D) It is not interaction of either magnetic field or electric field

23). An organic compound with molecular mass 120 absorbs in UV spectrum at 268 nm. In infra-red spectrum medium absorption bands are formed at (i) 3067-2907 cm^{-1} (ii) 1608 $cm^{-1}$and (iii) 1473 cm^{-1}. The NMR spectrum shows absorptions as (i) δ 6.79 singlet (10.4 squares) and (ii) δ 2.26 singlet (31.0 squares). What is the structure of compound?

(A) 1,2,3 –tri methyl benzene

(B) 1,3,5 tri methyl benzene

(C) 1,2,4 tri methyl benzene

(D) Para methyl benzaldehyde

24). Molecular formula : Molecular weight$C_3H_8O_2$

IR: 3525, 3025, 1290, 1140 cm^{-1}

NMR: (i) δ 4.3 (singlet, 7.8 squares) (ii) δ 4.15 (singlet, 23.1 squares) (iii) δ 3.6 (triplet, 15.2 squares) (iv) δ 3,48 (triplet, 15.3 squares). What will be structure of the compound?

(A) $CH_3OCH_2OCH_3$

(B) $CH_3CH_2OCH_2OH$

(C) $CH_3OCH_2CH_2OH$

(D) CH_3CH (OH)OCH_3

25). Molecular weight= 130

IR: 2950-2840, 1736, 1270, 1175 cm^{-1}

NMR: δ 3.8 (doublet, 9.2 squares); δ 1.9 (singlet, 13.4 squares); δ 1.75 (multiplet, 4.5 squares); δ 1.3 (doublet, 13.0 squares); δ 1.1 (multiplet, 9.1 squares) and δ 0.9 (triplet, 13.2 squares). What will be the structure of compound?

(A) $CH_3OCH_2CH(CH_3)CH_2COCH_3$

(B) $CH_3CH(CH_3)CH_2OCH_2OCH_3$

(C) $CH_3CH_2CH(CH_3)CH_2OCOCH_3$

(D) All the above

26). How many different protons present in Nitro benzene and Toluene

(A) 2 and 2

(B) 4 and 5

(C) 2 and 3

(D) 3 and 2

27). Why aldehydic proton appears much downfield in PMR

(A) The aldehydic proton is strongly deshielded because it lies in the deshielding zone of the carbonyl

(B) The aldehydic proton is strongly shielded because it lies in the shielding zone of the carbonyl

(C) The aldehydic proton is strongly shielded because it lies in the deshielding zone of the carbonyl

(D) The aldehydic proton is strongly deshielded because it lies in the shielding zone of the carbonyl

Name: **Enrolment No:** **SAP ID:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
PART-B: End Semester Examination, July 2020

Course: M.Sc. Chemistry **Semester: II**

Program: Spectroscopy of Organic compounds / Reagents and methods of organic synthesis

Course Code: CHEM 7009 **Max. Marks: 40**

Instructions: Read the instructions given below carefully:

1. All questions are compulsory.
2. Write all the answers in white A4 sheet
3. Mention your Name, Roll No and SAP ID on top of your answer sheet. At the end of answer sheet put your signature.
4. Upload answers in a single pdf file on the blackboard**.**

Q 1	A compound with the molecular formula $C_8H_8O_2$ shows in its IR spectrum bands at 3200 and 1700 cm^{-1}. The PNMR spectrum shows a peak at δ10.9 as a 1 H singlet. The other two peaks being at δ7.2 singlet (5H) and δ3.7 (2H). Its CNMR has four peaks in the region δ130 while one at high field δ 41.1 and at low field δ 178.3 to this position. Suggest a structure to the compound	**10**	**CO2**
Q 2	Explain the fragmentation of methyl butanoate , phenol and pentanoic acid	**10**	**CO1**
Q 3	Give mechanism of Sharpless asymmetric epoxidation	**10**	**CO3**
Q 4	Explain Heck and Stille reaction with suitable mechanism.	**10**	**CO3**