CH 101- End-Sem Exam-SET C

Instructions:

1) Read the question carefully and provide your answer by selecting the correct option.
2) Your Exam will automatically start at **02:00 pm** on **07.03.2022** and you have to click **submit** after attempting all the questions on or before **05:00 pm (For PWD candidates, 02:00- 06:00 pm)**on **07.03.2022**, after this given time you will**not be able to submit your answers.**
3) Failing to submit your response on time will be considered as**absent.**
4) Only fully correct answers will be accepted.
6) Total Marks: 60, Duration: 03:00 hours

1

Question
(2 Points)

Ques 9. Which of the following is least likely to undergo reductive elimination of a org

a) $Pd(Me)H(PPh_3)_2$

b) $(\eta^5\text{-}Cp)_2Zr($

c) $[Rh(COMe)I_3(CO)_2]^-$

d) $(\eta^5\text{-}Cp)_2Nb($

- A
- B
- C
- D

2

Question
(2.5 Points)

4. The maximum no. of stereoisomers possible for 4-phenylbut-3-

(A) 1
(B) 2
(C) 3
(D) 4

- A
- B
- C
- D

3

Question
(2 Points)

Ques 6 What is the order of the energies of *d*-orbitals in Square Pyramidal geome

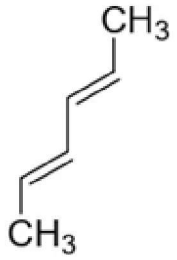
a) $d_{xz,}=d_{yz} < d_{xy} < d_{z^2} < d_{x^2-y^2}$
b) $d_{xz} < d_{yz} < d_{xy} <$
c) $d_{xz,}=d_{yz} < d_{z^2} < d_{xy} < d_{x^2-y^2}$
d) $d_{xy} < d_{xz,}=d_{yz} <$

- A
- B
- C
- D

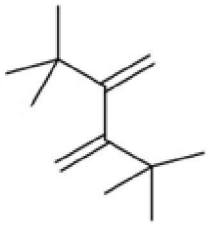
4

Question
(2.5 Points)

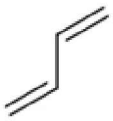
1. Correct order of the reactivity of diene is



I



II



III

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

- A
- B
- C
- D

5

Question
(3 Points)

3. Butadiene molecule is a conjugated molecule and can be considered (for p
box model) to be linear with length of 578 pm. With the mass of electron, 9.
kg and Planck's constant being 6.626 x 10^{-34} J, the absorbance band due to e
difference of 16.236 x 10^{-19} J would be due to transitions between quantum s

(A) 1 and 2; (B) 2 and 3; (C) 3 and 4 or (D) 4 anc

- A
- B
- C
- D

6

Question
(2 Points)

Ques 4. The number of CO ligands(neutral CO) attached to the metal center in the pr
following reaction, are:

$$(CH_3)Mn(CO)_5 + CO \longrightarrow$$

a) 6 b) 3

c) 4 d) 5

- A
- B
- C
- D

7

Question
(2 Points)

Ques 5. Which of the following octahedral complexes will be distorted to a maxim

a) $[Co(NH_3)_6]^{2+}$ b) $[Cu(H_2O)_6]^{2+}$

c) $[Cr(H_2O)_6]^{3+}$ d) $[Fe(CN)_6]^{4-}$

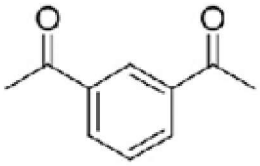
- A
- B
- C
- D

8

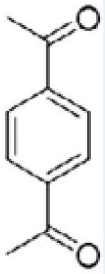
Question
(2.5 Points)

5. Which of the following compounds show only two signal in ^{1}H-NMR and band at ~1690 cm^{-1}

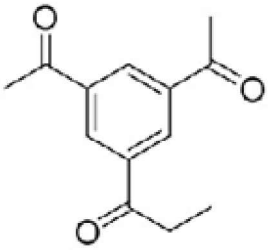
(A)



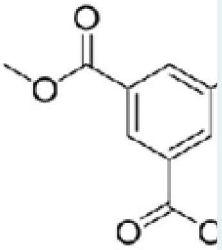
(B)



(C)



(D)



- A
- B
- C
- D

9

Question
(2 Points)

Ques 7. Which of the complexes have higher axial M-O bond strength? (M = Ni, C

(**1**)$[Ni(H_2O)_6]^{2+}$ and (**2**)$[Cu(H_2O)_6]^{2+}$

a) Bond strength is equal in both

b) **2**

c) **1**

d) None

- A

B

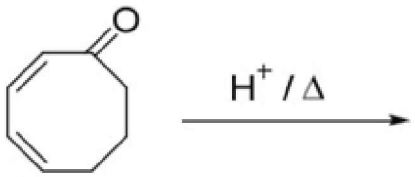
C

D

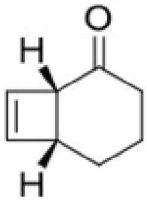
10

Question
(2.5 Points)

2. Major product formed during the given reaction is

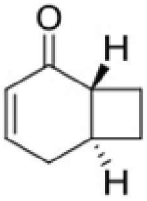


(A)



(B)

(C)



(D)

A

B

C

D

11

Question
(2 Points)

Ques 10. In the hydroformylation reaction, which of the following statemer

a) Oxidative addition of Dihydrogen is slow and is the rate determining step

b) Oxidative addition of Dihydrogen is fast and is the rate determining step

c) Product formation step is slow.

d) product formation step involves oxidative addition

- A
- B
- C
- D

12

Question
(2 Points)

Ques 2. Arrange the following in decreasing order of M-C stretching frequency in the IR

$[V(CO)_6]^{2-}$(**1**), $[Mn(CO)_6]^{2+}$(**2**), and $Cr(CO)_6$(**3**).

a) **2 > 3 > 1**

b) **1 > 2 > 3**

c) **1 > 3 > 2**

d) **None**

- A
- B

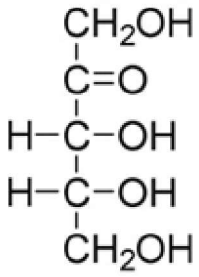
C

D

13

Question
(2.5 Points)

3. The absolute configuration at the two chiral centres are



(A) 3R ,4R (B
(C) 3S, 4R (D

A

B

C

D

14

Question
(2.5 Points)

8 The ^{1}HNMR spectrum of a compound E shows a doublet and a septet whic statements is true

(A) The spectrum is consisted with E containing a $CH_3CH_2CH_3$ groups

(B) The spectrum is consisted with E being $(CH_3)_2CHCl$

(C) The spectrum is consisted with E containing a CH_3CH_2 groups

(D) The spectrum is consisted with E being $(CH_3)_2CCl$

- A
- B
- C
- D

15

Question
(2.5 Points)

7. The carbonyl stretching frequency is higher for

(A) Acetic Acid (B) Acet

(C) Acetyl Chloride (D) Acet

- A
- B
- C
- D

16

Question
(3 Points)

1. The C-H bond vibration can be considered as that of a harmonic oscillato vibrational frequency of the C-H bond is 1.44 x 10^{13} Hz. A 1250 pN ((1 pN= can stretch the C-H bond (harmonic oscillator) by

(A) 1.0 Å (B) 2.0 Å; (C) 0.1 Å or (I

- A
- B
- C
- D

17

Question
(2 Points)

7. Given the wavefunction an electron in the 1s orbital of

$$\Psi = \frac{1}{(\pi a_0^3)^{1/2}} e^{-r/a_0}$$ and the radial probability density, $P(r) = 4\pi r$

most probable radius is:

(A) $\frac{3}{2}a_0$ (B) a_0 (C) $\frac{1}{2}a_0$ or (

- A

B

C

D

18

Question
(3 Points)

2. For the vibration of chemical bond, considering quantum harmonic oscillato average potential energy is equal to average kinetic energy. The uncerta displacement of the bond in the ground state i.e., $\Delta x = \sqrt{\hbar / 2\mu\omega}$. Then vibrational energy of the bond would be

(A) $\hbar\omega$ (B) $(1/4)\hbar\omega$ (C) $(3/4)\hbar\omega$ (D) $(1/2$

A

B

C

D

19

Question
(2 Points)

Ques 1. To satisfy the 18-electron rule in the complex [[cycloheptatriene]Mo$(CO)_3$]], the the coordinated cycloheptatriene is :

a) **6** b) **5**

c) **4** d) **2**

A

B

C

D

20

Question
(3 Points)

5. Four identical optical cuvettes are placed in parallel to each other. Ea contains a liquid with volume equal to the others and with molar extinction coe Lcm^{-1} M^{-1} at 500 nm, path length of 1.0 cm and concentration of the solute ML^{-1}. Light of 500 nm wavelength is allowed to enter through the first cu percentage transmission of light at the end of the fourth cuvette would be

(A) 0.01; (B) 0.1; (C) 1; (D)

A

B

C

D

21

Question
(2 Points)

Ques 3. Which of the following compounds will undergo reductive elimination of etl

(1) $V(CH_3)_2(PMe_3)_4$ (Me groups are cis to each other),
(2) $Os(CH_3)_2(CH_3CN)_2(POMe_3)_2$ (Me groups are trans to each other)
(3) $[Pt(CH_3)_3(CH_3CN)(PMe_3)_2]^+$ (Me groups are cis to each other)

a) 1 b) 3

c) 2 d) Ethane will not b from any of them

A

B

C

D

22

Question
(3 Points)

4. For a particle-in-a-box of length L = 6.63 Å, the wavefunction is $\Psi(x) = \sqrt{\frac{2}{L}} \sin \frac{n\pi x}{L}$. The value of linear momentum in the second excited unit of kg m s^{-1}) would be, Use h = 6.630 ×

(A) 1.0×10^{-24}; (B) 0.1×10^{-24}; (C) 1.5×10^{-24}; (D)

A

B

C

D

23

Question
(3 Points)

6. Based on the relationship between Einstein A and B coefficients, the ratio of nm to that at 800 nm would be:

(A) 1/27 (B) 27 (C) 8 Or

- A
- B
- C
- D

24

Question
(2 Points)

Ques 8. The molar absorptivity at λ_{max} is minimum for:

a) $[Mn(H_2O)_6]^{2+}$ b)[Ni(

c) $[Cr(H_2O)_6]^{2+}$ d) [Co

- A
- B
- C
- D

25

Question
(2.5 Points)

6. Which one of the molecules will have n $\rightarrow \pi^*$ at the longest wav

(A) HCHO (B) CH_3

(C) PhCOPh (D) CH_3

- A
- B
- C
- D