

Roll No. ....

Total Printed Pages - 10

**F - 306**

**M. Sc. (First Semester)**  
**EXAMINATION, Dec. - Jan., 2021-22**  
**CHEMISTRY**  
**Paper Second**  
**(Concepts in Organic Chemistry)**

*Time : Three Hours*

*[Maximum Marks : 80]*

*[Minimum Pass Marks : 16]*

**Section - A**

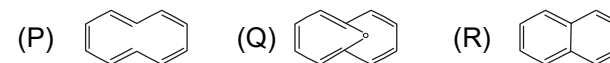
**(Objective / Multiple Choice Questions)**

(1 Mark each)

**P.T.O.**

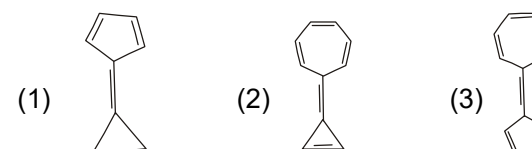
[2]

1. Among P-R, the aromatic compounds are ?



- (A) P, Q and R  
(B) P and Q only  
(C) Q and R only  
(D) P and R only

2. The order of bond length in common C-C bond in the following compound is -



- (A)  $2 > 3 > 1$   
(B)  $1 > 3 > 2$   
(C)  $3 > 1 > 2$   
(D)  $1 > 2 > 3$

3. Zero dimensional nonomaterial is?

- (A) CNT  
(B) Graphene  
(C) Fullerene  
(D) None of these

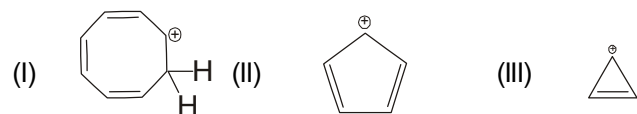
4. Which side of crown ether is hydrophilic ?

- (A) Inner side  
(B) Outer side  
(C) At the periphery  
(D) None of the above



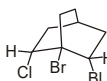
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[3]

5. Among the carbocation given below ?



- (A) I is aromatic, II antiaromatic and III is aromatic  
 (B) I is homoaromatic, II is antiaromatic and III is aromatic  
 (C) I is antiaromatic, II is aromatic and III is homoaromatic  
 (D) I is homoaromatic, II is aromatic and III is antiaromatic
6. In the boat confirmation of cyclohexane, the most destabilizing interaction is :  
 (A) Eclipsing  
 (B) 1,3 diaxial  
 (C) 1,3 diequatorial  
 (D) Flagpole-Flagpole
7. Achiral compound is / are ?

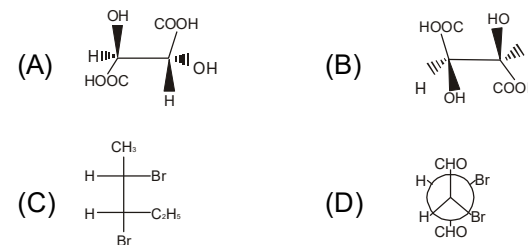
- (A)   
 (B)   
 (C)   
 (D) All of these

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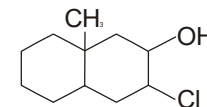
P.T.O.

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8. Which one of the following compounds is meso ?



9. Number of stereocenter and stereoisomer of the following compound is ?



- (A) 2 and 4 (B) 3 and 8  
 (C) 4 and 16 (D) None of these
10. Match the following -

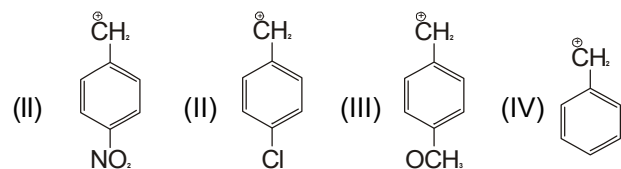
List -I	List - II
(a) $\alpha$ and $\beta$ glucose	(a) Mutarotation
(b) (+) and (-) glucose	(b) Enantiomers
(c) D and L notation	(c) Anomers
(d) $\alpha$ - form-open chain - $\beta$ form relationship	(d) Configurational

	a	b	c	d
(A)	2	3	4	1
(B)	2	3	1	4
(C)	3	2	4	1
(D)	3	2	1	4

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11. What is the stability order of the following carbocations?

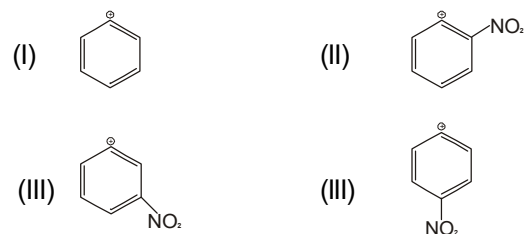


- (A) I > III > II > I  
 (B) III > IV > II > I  
 (C) III > II > IV > I  
 (D) I > II > III > IV

12. Reaction intermediate of  $E_{1cb}$  reaction is ?

- (A) Carbocation  
 (B) Carbanion  
 (C) Carbene  
 (D) Cyclic transition State

13. What is the stability order of following carbanion?



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

[6]

14. Alkyl azide in photolytic reaction to form  $N_2$  gas and product, the reaction intermediate is :

- (A) Carbene  
 (B) Nitrene  
 (C) Carbocation  
 (D) Carbanion

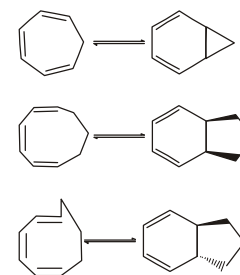
15. In  $E_2$  reaction the dihedral angle to anti-periplanar conformation is

- (A)  $0^\circ$  (B)  $90^\circ$   
 (C)  $120^\circ$  (D)  $180^\circ$

16. Cope reaction is a type of ?

- (A) Electrocyclic reaction  
 (B) Cycloaddition reaction  
 (C) Cheletropic reaction  
 (D) Sigmatropic reaction

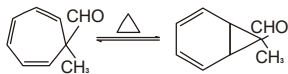
17. The direction of rotation of the following thermal electrocyclic ring closures respectively are -



- (A) Disrotatory, Disrotatory, Disrotatory,  
 (B) Conrotatory, Conrotatory, Conrotatory,  
 (C) Disrotatory, Disrotatory, Conrotatory,  
 (D) Disrotatory, Conrotatory, Disrotatory,

[7]

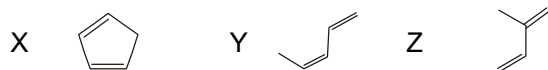
18. Select the correct classification in the following reaction from options I to IV given



- (I) Conrotatory electrocyclic reaction  
 (II) Disrotatory electrocyclic reaction  
 (III) Valence isomerization  
 (IV)  $4\pi s + 2\pi s$  cycloaddition reaction

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

19. The order of reactivity of the following dienes X, Y and Z in the Diels Alder reaction -

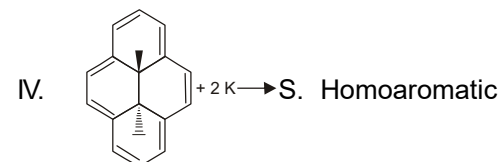


- (A)  $X > Y > Z$   
 (B)  $X > Z > Y$   
 (C)  $Y > Z > X$   
 (D)  $Z > Y > X$

20. The correct match for the product of the reactions in column A with the properties in column B in

Column A	Column B
I.  + 2K $\longrightarrow$	P. Aromatic
II.  + $\text{H}_2\text{SO}_4 \longrightarrow$	Q. Antiaromatic
III. $\xrightarrow{\Delta}$	R. Non-aromatic

[8]



- (A) I - P, II - S, III - R, IV - Q  
 (B) I - P, II - R, III - Q, IV - S  
 (C) I - Q, II - R, III - S, IV - P  
 (D) I - S, II - Q, III - R, IV - P

### Section - B

#### ( Very Short Answer Type Question )

(2 marks each)

- How many pentagons and hexagons are present in  $\text{C}_{60}$ ?
- What are the difference between conjugation and cross conjugation? Give suitable examples.
- What are meso compound? Give suitable examples.
- Explain the optical activity in biphenyl.
- Define singlet and triplet carbene.
- What is  $\text{E}_{1\text{CB}}$  reaction?
- What is Aza cope reaction?
- What is Cheletropic reaction? Explain with suitable examples.

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**Section - C**

**(Short Answer Type Question )**

(3 marks each)

1. What do you mean by homoaromaticity?
2. What are cyclodextrins? Draw examples of beta-cyclodextrin.
3. What do you mean by stereoselective reaction? Explain with suitable examples.
4. Draw the structure of trans decalin and explain the stereochemistry.
5. What is Hunsdiecker reaction? Explain with example.
6. What is  $E_2$  elimination reaction? Write a reaction and energy profile diagram.
7. Draw the molecular orbital diagram of 1, 3, 5 hexatriene.
8. What is Diels Alder reaction? Explain with suitable examples.

[10]

**Section - D**

**( Long Answer Type Questions )**

**(5 marks each)**

1. What are crown ethers? Explain synthesis and application.

**Or**

What are Rotanane? Explain synthesis and application.

2. Explain the Asymmetric Synthesis with suitable example.

**Or**

Explain the stability of different conformations of cyclohexane with energy profile.

3. What are elimination reactions? Explain the  $E_1$  reaction with suitable example and energy profile diagram.

**Or**

What is Sandmeyer reaction? Write a reaction and mechanism

4. Discuss the FMO and PMO approach.

**Or**

Draw and discuss the Woodward correlation diagram of 1,3,5 hexatriene in disrotatory and conrotatory motion.