

DSPM UNIVERSITY, RANCHI  
END SEMESTER EXAMINATION-2020  
M.Sc. SEMESTER-IV  
Model Question Paper-EC4

Sub – **Inorganic Chemistry**  
Paper – **EC4 /Metal Clusters**

Time – **2 Hour**  
Total Marks – **70**

**Section-A**  
**Answer any three questions.**

1. Discuss preparation and properties of heteropoly acids of Mo or V. **10**
2. Discuss structure and bonding in higher boranes. **10**
3. Write a note on biological nitrogen fixation. **10**
4. Organoboranes acts as a reducing agent. Explain with suitable examples. **10**
5. Write mechanism and one synthetic use of the following reactions:  
(a) Corey-Bakshi-Shibata reaction  
(b) Tischenko reaction **2 x 5**
6. Total electron count in the following complexes are :  
(i)  $\text{Rh}_6(\text{CO})_{12}$  (ii)  $\text{Ir}_4(\text{CO})_{12}$  (iii)  $\text{Os}_5\text{C}(\text{CO})_{15}$  (iv)  $(\eta^5\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_2$   
(v)  $[\text{Ru}_5\text{N}(\text{CO})_{14}]^-$  **5 x 2**

**Section-B**  
**Answer any two questions.**

7. Describe methods of preparation, bonding, and important reactions of transition metal nitrosyls. **20**
8. Describe Wade rule for counting electrons in carbonyl and nitrosyl clusters. **20**
9. Explain any two of the following reactions with mechanism and synthetic uses.  
(a) McMurry reaction  
(b) Benkeser reduction  
(c) Willgerdot reaction **2 x 10**
10. Discuss structure and bonding of any two of the followings:  
(a) Carboranes  
(b) Borazenes  
(c) Phosphazenes **2 x 10**

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