R7230	Sub. Code
	536301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Chemistry

ADVANCED INORGANIC CHEMISTRY

(CBCS – 2019 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. How to synthesis metal alkyls?

2. Why ferrocene remains as stable compound?

3. What is meant by nucleophile and electrophile?

4. Write the Pauson-Khand reaction.

5. Define hole formalism.

6. State the spin selection rule.

7. Write the reaction catalyzed by monooxygenase.

8. Draw the structure of *cis*-platin.

9. Mention any two functions of hemocyanin.

10. What is meant by non-heme iron proteins?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Discuss the ring closing metathesis in organic synthesis.

Or

(b) Write about cyclopentadienyl complexes with an example.

12. (a) Explain the Monsanto process.

Or

(b) What is Ziegler-Natta polymerization reaction? Explain.

13. (a) Discuss the Tanbe-Sugano diagram for d^8 electron configuration.

Or

(b) How to determine the magnetic susceptibility using Gouy balance?

14. (a) Explain the molecular mechanism of ion transport across membrane.

Or

(b) Write the therapeutic applications MRI agents.

15. (a) Discuss oxygenation and deoxygenation cycle.

Or

(b) Explain the role of Vitamin B-12.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Briefly discuss about the Fisher and Schrock type carbene complexes.

17. Explain the nucleophilic and electrophilic attack on coordinated ligands in organometallic complexes.

18. Derive the Laporte orbital selection rule with an example.

19. Explain the photosystem 1 and 2 with an example.

20. Discuss the structure, function and principle involved in carboxypeptidase and carbonic anhydrase.

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R7231	Sub. Code
	536302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Chemistry

ADVANCED ORGANIC CHEMISTRY

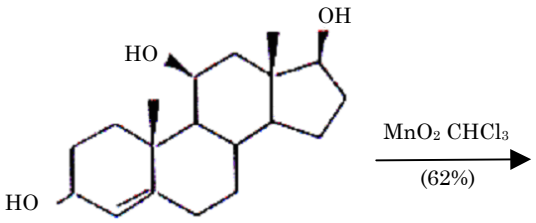
(CBCS – 2019 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Predict the product of the following organic reaction:



2. What is Wacker oxidation?

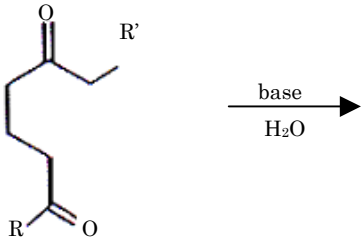
3. What is heterogeneous hydrogenation?

4. What is the function of DIBALH?

5. Define Ritter reaction.

6. What is solid state organic synthesis?

7. Write the product of the following reaction:



8. Define Pauson-Khand reaction.

9. Give the important strategies of retrosynthesis.

10. Define 'chemoselectivity'.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write the Sharpless asymmetric dihydroxylation.

Or

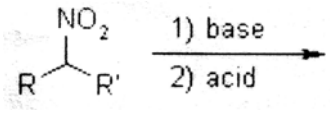
(b) Write hydroboration-oxidation of alkenes and mechanism.

12. (a) What is Wilkinson catalyst? Give the mechanism of catalysis for the hydrogenation of alkenes.

Or

(b) Write any five $LiAlH_4$ catalyst used in organic synthesis.

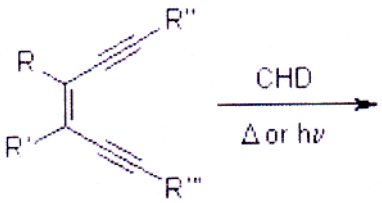
13. (a) Predict the product with suitable mechanism of the following reaction:



Or

(b) Write short notes on Robbinson annulation.

14. (a) Write the product and mechanism of the following reaction:



Or

(b) Write the different approaches towards the synthesis of three membered ring.

15. (a) Why synthons are idealizated reagents? Explain.

Or

(b) Explain the role of protective groups in organic synthesis.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss briefly Woodward Prevost reaction and mechanism.

17. Write the reaction and mechanism of (5+5)

(a) Birch reduction;

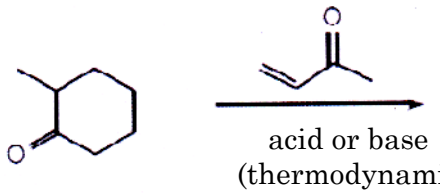
(b) McMurry reaction.

18. Write short notes on (5+5)

(a) Baylis-Hillman reaction

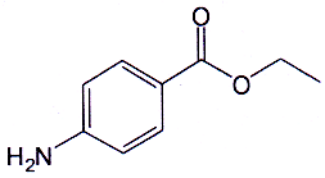
(b) Crown ether.

19. Write the product with mechanism of the following organic reactions of six membered ring:



acid or base
(thermodynamic
conditions)

20. Write suitable disconnections and synthesis of the following compound:



R7232	Sub. Code
	536303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Chemistry

ADVANCED PHYSICAL CHEMISTRY

(CBCS – 2019 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Write the Hamiltonian operator for hydrogen molecule ion.

2. What values of J may arise in the following ^1S, ^2P, ^3P ?

3. What type of molecules give vibrational spectra?

4. What is meant by fundamental and overtones?

5. Explain Lithium-ion battery.

6. What is cathodic protection and anodic protection?

7. What are fermions? Give an example.

8. Calculate the rotational partition function of H_2 gas at 300 K, the moment of inertia is 0.459×10^{-40} gm.

9. What is Scholty defects?

10. What are super conductors?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Obtain an expression for eign function and eigen value for Helium atom.

Or

(b) What are symmetry and antisymmetry wave function? State Paulis Antisymmetry principle.

12. (a) Describe rotation-vibration Raman spectra obtained for a diatomic molecule.

Or

(b) What type of a vibrational spectrum is expected for simple harmonic oscillator in the form of diatomic molecule?

13. (a) What are fuel cells? Explain the different types of fuel cells.

Or

(b) Discuss the Leclanche cell and alkaline batteries.

14. (a) Derive the basic equation given by Fermi-Dirac statistics.

Or

(b) Derive the Sakur-Tetrode equation for the entropy of a mono atomic gas.

15. (a) Write a short note on Meissner effect.

Or

(b) Discuss the theory of super conductors.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the self consistent field orbitals.

17. Write a note on

    (a) Franck Condon principle.

    (b) Stokes lines and antistokes lines in Raman spectra.

18. (a) Explain the Pourbaix diagram for Fe-H_2O system. (5)

    (b) Discuss the Ni-Cd battery. (5)

19. Derive the equation for equilibrium constant of a reaction in terms of Partition function.

20. Discuss the atomic theory of diffusion and explain the self diffusion mechanism.

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