

Time: 2:30 Hours

Marks: 70

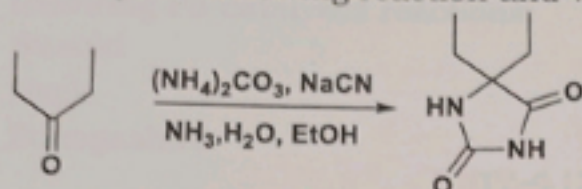
Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

UNIT-1 (14 marks)Answer **ALL** questionsQ.1 (a) **Answer the following**

4 Marks

- (1) What are multicomponent reactions (MCR)? Write its advantages. 2
- (2) Identify the following reaction and write its plausible mechanism. 2

Q.1 (b) **Answer any two question out of three.**

10 Marks

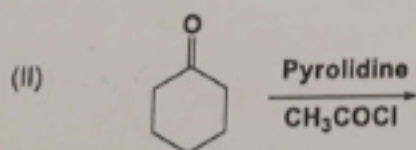
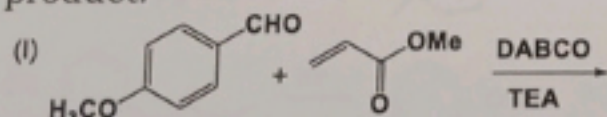
Describe principle, mechanism and three applications of the following MCR:

- (1) Ugi reaction 5
- (2) Biginelli reaction 5
- (3) Mannich reaction 5

UNIT-2 (14 marks)Answer **ALL** questionsQ.2 (a) **Answer the following**

4 Marks

- (1) What is organocatalyst? Give three examples. 2
- (2) Identify the following reactions (I & II) and write it's appropriate product: 2

Q.2 (b) **Answer any two question out of three.**

10 Marks

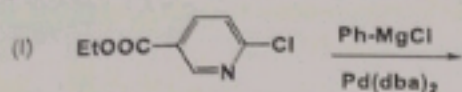
- (1) What is Conjugate addition reaction? Describe various factors affecting conjugate and direct addition reaction with example. 5
- (2) Describe Horner-wadsworth-emmons (HWE) reaction in detail. 5
- (3) Write a note on peterson olefination. 5

UNIT-3 (14 marks)
Answer **ALL** questions

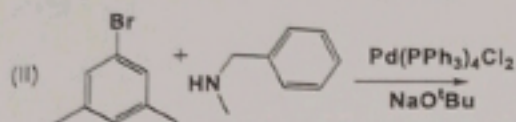
Q.3 (a) Answer the following

4 Marks

- (1) Write any four structure of Pd⁽⁰⁾ complexes which are utilized in the C-C cross coupling reaction.
- (2) Identify the following reactions (I & II) and write it's appropriate product.



2



Q.3 (b) Answer any two question out of three.

10 Marks

Describe principle, mechanism and two applications of the following Pd-catalyzed reactions:

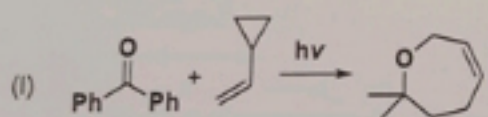
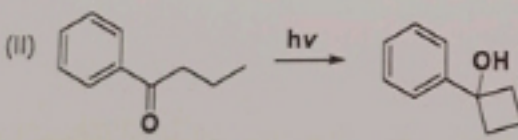
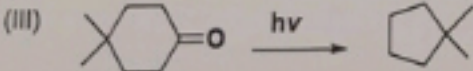
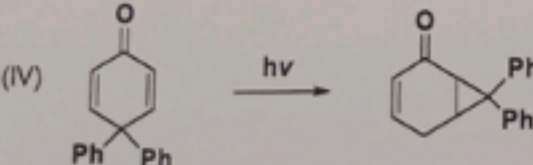
- (1) Suzuki 5
- (2) Heck 5
- (3) Sonogashira 5

UNIT-4 (14 marks)
Answer **ALL** questions

Q.4 (a) Answer the following

4 Marks

- (1) Explain:
 - (i) Grothurs-draper law
 - (ii) Stark-Einstein law
 - (iii) Quantum yield
 - (iv) Kasha's rule
- (2) Make correct pair from the following given list of photochemical transformation (I to IV) and their corresponding name reaction/primary processes (a to d).

Photochemical Transformation	Name of Reaction/Primary process
(I) 	(a) Zimmerman Rearrangement
(II) 	(b) Norrish Type-I
(III) 	(c) Norrish Type-II
(IV) 	(d) Peterno-Buchi reaction

2

M.Sc.(Chem.) Semester - 2 (CBCS) Examination
 March/April- 2019 (New Course)
 Inorganic Chemistry (CORE)

Time: 2:30 Hours

Instructions:

Marks: 70

- All questions are compulsory.
- Figures to the right indicate marks.

Unit-1 (14 marks)Answer ALL questions

- Q.1 (a) Answer the following. 4 Marks**
- Write a short note on magnetic induction. 2
 - Give the characteristic of paramagnetic substances. 2
- Q.1 (b) Answer any two question out of three. 10 Marks**
- Explain the theory of spin magnetic moment and orbital magnetic moment. 5
 - Derive the Russell-Saunders coupling and explain with the help of p^2 system. 5
 - Write a note on magnetic properties of Lanthanide series. 5

Unit-2 (14 marks)Answer ALL questions

- Q.2 (a) Answer the following. 4 Marks**
- Calculate the number of ligands "n" in following metal complexes.
 - $[\text{Co}(\text{CO})_n]^+$
 - $[\text{Cu}(\eta^5\text{-CP})_n]$
 - $[\text{Rh}(\text{CO})_n]^+$
 - $[\text{Fe}(\text{CO})_n]$
- Q.2 (b) Answer any two question out of three. 10 Marks**
- Discuss on ligands similar to carbonyl (CO). 5
 - Write a note on Wacker (Smidt) process. 5
 - Write a note on hydrogenation of alkene by Wilkinson Catalyst. 5

Unit-3 (14 marks)Answer ALL questions

- Q.3 (a) Answer the following. 4 Marks**
- Write a short note on importance and deficiency of calcium and sodium. 2
 - Write a short note on BAL and DTPA. 2
- Q.3 (b) Answer any two question out of three. 10 Marks**
- Explain metalloenzymes with its functions and example. 5
 - Explain role of Hemoglobin(Hb) and Myoglobin(Mb) in oxygen transport with its function. 5
 - Discuss in detail: Cytochrome 5

Unit-4 (14 marks)
Answer ALL questions

Q.4 (a) Answer the following.

- (1) Discuss the structure of phosphazenes.

4 Marks

Q.4 (b) Answer any two question out of three.

- (1) Explain the manufacturing of silicones.
(2) Discuss the properties of phosphazenes.
(3) What is zeolites? Give its types and application.

10 Marks

5

5

5

Unit-5 (14 marks)
Answer ALL questions

Q.5 (a) Answer the following.

- (1) Write a note on types and classification of nanomaterials.

4 Marks

Q.5 (b) Answer any two question out of three.

- (1) Discuss the properties of metal oxide nano materials.
(2) Write a detail note on following instruments for nanoparticle characterization.
(I) SEM (II) XRD
(3) Discuss the cause of interest in nanomaterials.

10 Marks

5

5

5

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MSC2CPcC103x

Seat No : _____

M.Sc.(Chem.) Semester - 2 (CBCS) Examination

March/April- 2019 (New Course)

Physical Chemistry (CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

- All questions are compulsory.
- Figures to the right indicate marks.

-
- Q.1 (a) Answer the following 4
- Explain Stereo regular polymers. 2
 - Give an account of miscellaneous reaction. 2
- Q.1 (b) Answer any two questions out of three. 10
- Describe the beif classification of polymers. 5
 - Explain Cross linking reaction. 5
 - Describe Block and Graft polymers. 5
- Q.2 (a) Answer the following 4
- Write a note on co-ordination polymerisation. 4
- Q.2 (b) Answer any two questions out of three. 10
- Explain the methods of initiating free radical polymerization. 5
 - Discuss co-polymerisation and its kinetics. 5
 - Explain cationic and anionic polymerisation. 5
- Q.3 (a) Answer the following 4
- Explain Molecular weight control in polycondensation 2
 - Discuss the Reaction route of polyfunctional compounds 2
- Q.3 (b) Answer any two questions out of three. 10
- Explain the effect of monomer concentration and temperature on direction of polycondensation reaction. 5
 - Write a note on 5
 - Kinetics of poly condensation reaction.
 - Non linear polycondensation.
 - Discuss the factors affecting the rate of polycondensation and molecular weight of the polymer. 5

Q.4 (a) Answer the following

- (1) Define: Zeta potential and Critical Micellar Concentration.
- (2) Explain surface active agent.

Q.4 (b) Answer any two questions out of three.

- (1) Discuss about lyophobic and lyophilic sols.
- (2) Define the term: Adsorption, Absorption and Sorption. Discuss the influence of temperature and pressure on adsorption.
- (3) Give a brief explanation about types of adsorption.

Q.5 (a) Answer the following

Explain Hydrogen over potential.

Q.5 (b) Answer any two questions out of three.

(1) Write a note on

- i. Concentration cell without transference.
- ii. Ni-Fe accumulator.

(2) Give a brief explanation about Decomposition potential.

(3) i. Explain elimination of liquid junction potential.

ii. The EMF of the concentration cell is 0.0118 volt at 25°C Temp.

$\text{Pb} / \text{PbSO}_4 / \text{CuSO}_4 (a_{\pm} = 0.02205) : \text{CuSO}_4 (a_{\pm} = 0.00639) / \text{PbSO}_4 / \text{Pb}$
Calculate the transference number of Cu^{+2} .

M.Sc.(Chem.) Semester - 2 (CBCS) Examination
 March/April- 2019 (New Course)
 Analytical Chemistry (CORE)

Time: 2:30 Hours

Instructions:

- All questions are compulsory.
- Figures to the right indicate marks.

Marks: 70

Q.1 (a) Answer the following questions.

[04 Marks]

- What is Monograph?
- What is Potency of drug? How it can be calculated?

Q.1 (b) Answer any two questions out of three.

[10 Marks]

- Write a note on paddle type dissolution apparatus.
- Discuss importance and experimental procedure for Residue on Ignition(ROI) test.
- Discuss principle and estimation procedure to determine Fe and Pb as heavy metal.

Q.2 (a) Answer the following question.

[04 Marks]

- Calculate %relative standard deviation for following six replicates observations.

Set	1	2	3	4	5	6
Observation	41,949	42,741	43,813	43,124	42,015	43,342

Q.2 (b) Answer any two questions out of three.

[10 Marks]

- Explain Linearity study with suitable example.
- Discuss student t - test in detail with example.
- Find the value of co-relation co-efficient (r) for following sets of data.

X_i	100	200	300	400	500
Y_i	1012	2133	3149	4035	5051

Q.3 (a) Answer the following question.

[04 Marks]

- Discuss advantages and limitations of microwave assisted reactions.

[10 Marks]

Q.3 (b) Answer any two questions out of three.

1. Enlist basic twelve principles of green chemistry and explain its role in day to day life.
2. What is atom economy? explain atom economy with suitable examples.
3. Explain oxygen combustion flask method for the estimation of halogens.

Q.4 (a) Answer the following question.

[04 Marks]

1. Discuss types of intellectual property laws in brief.

Q.4 (b) Answer any two questions out of three.

[10 Marks]

1. Define patent and discuss what cannot be patented under Indian patent law?
2. Give an account of Copyrights and discuss its relative rights.
3. What are the essential documents to be generated and submitted by a patentee?

Q.5 (a) Answer the following question.

[04 Marks]

1. Discuss basic principles for separation of biological fluids in brief.

Q.5 (b) Answer any two questions out of three.

[10 Marks]

1. Write a note on GOD-POD method for estimation of blood glucose.
2. Give principle, experimental procedure and limitation of Sahli's Hemoglobinometer.
3. What is cholesterol? discuss ZAK's method for estimation of total blood cholesterol.

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Msc2CheC0110 Seat No: _____
M.Sc.(Chem.) Semester - 2 (CBCS) Examination

March/April- 2018
INORGANIC CHEMISTRY
(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1 Answer any **seven** of the following ten questions. (14)

1. What is the importance of iron in human body?
2. What is Ion-Exchangers? Give the classification of Ion-Exchanger.
3. Draw the structure of Hemoglobin.
4. Explain the toxicity of Lead.
5. Give the applications of Aluminon.
6. What is the limitations of ESR spectroscopy?
7. Define the Organometallic compound with and give any two examples.
8. What is g (gyro magnetic) factor ratio in ESR?
9. Discuss eighteen electron rule in organometallic compound.
10. Give the applications of DMG in inorganic analysis.

Q.2 Answer any **two** of the following three questions. (14)

1. Explain in brief Zeeman Splitting in ESR.
2. Discuss the structure of Chlorophyll and its role in photosynthesis.
3. Explain the physical properties of η^2 alkene OMC in transition metals.

Q.3 Answer the following questions. (14)

1. Discuss the transport and storage of Protein.
2. Give the use of following reagents in inorganic analysis:
(i) Cupferron (ii) Pyragalloi

OR

Q.3 Answer the following questions. (14)

1. Discuss the role of iodine in activity of thyroid hormones.
2. Discuss the preparation of π -bonded complex compound containing transition metals.

Q.4 Answer any **two** of the following three questions. (14)

1. Discuss ESR spectrum of one electron influenced by single proton.
2. Explain the chemical properties of η^3 complexes.
3. Give the use of following reagents in inorganic analysis:
(i) Dithiozone (ii) Diphenyl carbazone

Q.5 Answer any **two** of the following four questions. (14)

1. Give the classification of σ -bonded OMC of transition metals.
2. Discuss the experimental technique for the separation of following ions:
(i) Zinc and Magnesium
(ii) Chloride and Bromide
3. Explain the role of bulk metal in biological process.
4. Give the applications of different types of ion-exchangers.

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Msc2CheC0310 Seat No: _____
M.Sc.(Chem.) Semester - 2 (CBCS) Examination
March/April- 2018
PHYSICAL CHEMISTRY
(CORE)

Time: 2:30 Hours

Instructions:

1. All Questions are compulsory & carries equal 14 marks
2. Draw suitable diagram / Scheme wherever necessary.

Marks: 70

Q.1 Answer any **seven** of the following ten questions. (14)

1. Describe curing of epoxy and phenol formaldehyde resins.
2. Give the full forms and repeat unit structures of: CA, and PVC.
3. Discuss the effect of monomer concentration on direction of polycondensation reaction.
4. What is Flory's approach of solubility parameter?
5. Give difference between Syndiotactic and Atactic polymers.
6. What are initiators? Give decomposition of t-butyl hydroperoxide and AIBN.
7. Define functionality and give at least three examples of polyfunctional compounds
8. Define: Copolymer, and Thermoplastics.
9. What are inhibitors? Give names of any five inhibitors.
10. Discuss solid-phase polymerization.

Q.2 Answer any **two** of the following three questions. (14)

1. Describe Reactivity ratios and copolymerization behavior.
2. What is ionic polymerization? Discuss the kinetics of cationic polymerization in detail.
3. Discuss thermodynamics of ring transformation to linear polymers.

Q.3 Answer the following questions. (14)

1. Write a note on molecular weight control in polycondensation.
2. Discuss step-wise polymerization with reference to triisocyanate.

OR

Q.3 Answer the following questions. (14)

1. Describe the factors affecting the rate of polycondensation and molecular weight of the polymer.
2. Discuss gel permeation chromatography method in detail.

Q.4 Answer any **two** of the following three questions. (14)

1. Explain thermodynamics of simple liquid mixtures in detail.
2. Discuss statistics of linear olycondensation.
3. Discuss kinetics of polycondensation reaction.

Q.5 Answer any **two** of the following four questions. (14)

1. Give detailed account on addition and substitution reactions in polymers.
2. Describe fractional precipitation method.
3. Discuss emulsion polymerization.
4. What is degradation? Classify degradation reactions. Explain physical degradation in detail.

M.Sc.(Chem.) Semester - 2 (CBCS) Examination

May/June-2021 (NEW COURSE)

Inorganic Chemistry (CORE)

Time: 1:30 Hours

Marks: 42

Instructions:

1. Figure to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

- Que-1(a) Answer the following: (04)
 (A) Discuss L-S coupling
 (B) Find out the spectral term of the following
 (1) Cu^{2+} (2) Cr^{3+}
- Que-1(b) Answer the following (Any Two) (10)
 (A) Evaluate the Magnetic Moment for Multiple width small compare to kT
 (B) Derive Van Vleck formula for magnetic Susceptibility
 (C) Discuss the stereo chemical applications and magnetic properties of Lanthanide and Actinide series
- Que-2(a) Answer the following: (04)
 (A) Why $\text{B}(\text{CH}_3)_3$ is an organometallic compound but $\text{B}(\text{OCH}_3)_3$ is not?
 (B) Explain 18 Electron rule
- Que-2(b) Answer the following (Any Two). (10)
 (A) Give the difference between Homogeneous and heterogeneous catalysis
 (B) Write note on Hydrogenation reaction
 (C) Write note on reductive elimination reaction
- Que-3(a) Answer the following: (04)
 (A) Define heme and globin
 (B) Draw the structure of Porphyrin.
- Que-3(b) Answer the following (Any Two). (10)
 (A) Define Metalloporphyrines and discuss the structure of hemoglobin and explain its function as an oxygen carriers.
 (B) Discuss the role of bulk metal in biological process
 (C) Explain the work of cytochromes as electron carriers
- Que-4(a) Answer the following: (04)
 (A) Draw the structure of Borazene
 (B) Name any two types of Phosphazenes.
- Que-4(b) Answer the following (Any Two). (14)
 (A) Describe the method of synthesis of Borezene
 (B) Discuss the properties and uses of Phosphazenes
 (C) Write note on general characteristics of Silicones.
- Que-5(a) Answer the following: (04)
 (A) Define Nano materials
 (B) Write a note on Quantum dots
- Que-5(b) Answer the following (Any Two). (14)
 (A) How Nano catalyst property can be tailored?
 (B) Write short note on Basic Synthesis pathways of Nanomaterials.
 (C) Explain SEM or TEM in detail.

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Seat No : _____

MSCZCACc104x
M.Sc.(Chem.) Semester - 2 (CBCS) Examination
May/June-2021 (NEW COURSE)
Analytical Chemistry (CORE)

Marks: 42

Time: 1:30 Hours

Instructions:

- Figure to the right indicate marks.
- There are five questions in the question paper.
- Answer any three of the following questions.

(04)

Que-1(a) Answer the following question:

- What is dissolution study? Discuss factor affecting results of dissolution studies.

(10)

Que-1(b) Answer any two questions out of three.

- Discuss importance and experimental procedure for loss on drying (LOD) test.
- Give introduction and historical account of Indian pharmacopoeia.
- Discuss principle and experimental procedure to determine Arsenic as heavy metal.

(04)

Que-2(a) Answer the following question:

- Define the following terms: (a) Spread, (b) Deviation
- What is Specificity study?

(10)

Que-2(b) Answer any two questions out of three.

- Distinguish between accuracy and precision; explain any one in detail.
- Explain F-test with suitable example.
- Calculate the value of co-relation co-efficient (r) for following sets of data.

(04)

Que-3(a) Answer the following question.

- Explain the concept of atom economy with suitable example.

(10)

Que-3(b) Answer any two questions out of three.

- Enlist basic twelve principles of green chemistry and explain any one with example.
- Discuss the concept of non-traditional greener alternative approach.
- What is ionic liquid? Give an example of ionic liquid mediated reaction.

(04)

Que-4(a) Answer the following question.

- What are Trademarks? Explain its types.

(14)

Que-4(b) Answer any two questions out of three.

- Define patent and discuss what cannot be patented under Indian patent law?
- What is Paris Convention? Enlist its principal features and advantages.
- Explain publication and examination of patent application.

Que-5(a) Answer the following:

- Write a note on Sahil's method for estimation of Hemoglobin.

(04)

Que-5(b) Answer any two questions out of three.

- Explain quantitative determination of urine glucose.
- Discuss principles for separation of biological fluids.
- Give clinical significance and experimental procedure to determine cholesterol.

(14)

M.Sc.(Chem.) Semester - 2 (CBCS) Examination
 May/June-2021 (NEW COURSE)
 Physical Chemistry (CORE)

Marks: 42

Time: 1:30 Hours

Instructions:

1. Figure to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

- Que-1(a) Answer the following: (04)
 (1) Differentiate: Atactic, Syndiotactic and Heterotactic.
 (2) Give an account of cyclization reaction.. (10)
- Que-1(b) Answer any two questions out of three. (04)
 (1) Describe the beif classification of polymers.
 (2) Explain polymer miscellaneous reactions and curing of epoxy resins.
 (3) Describe Block and Graft polymers.
- Que-2(a) Answer the following: (10)
 Explain the mechanism of initiated polymerization.
- Que-2(b) Answer any two questions out of three. (04)
 (1) Discuss co-polymerisation and its kinetics.
 (2) Write a note on co-ordination polymerisation.
 (3) Explain cationic polymerisation and its kinetics.
- Que-3(a) Answer the following: (10)
 (1) Explain Molecular weight control in polycondensation
 (2) Discuss the reaction route of polyfunctional compounds
- Que-3(b) Answer any two questions out of three. (04)
 (1) Explain the effect of monomer concentration and temperature on direction of polycondensation reaction.
 (2) Write a note on
 (i) Kinetics of poly condensation reaction.
 (ii) Non linear polycondensation
 (3) Discuss the factors affecting the rate of polycondensation and molecular wight of the polymer.
- Que-4(a) Answer the following: (14)
 (1) Define: Zeta potential and CMC.
 (2) Explain surface active agent.
- Que-4(b) Answer any two questions out of three. (04)
 (1) Discuss about lyophobic and lyophilic sols.
 (2) Derive langmuirs adsorption isotherm.
 (3) Define the term: Adsorptio, Absorption and Sorption Give a brief explanation about types of adsorption.
- Que-5(a) Answer the following: (14)
 Explain Decomposition voltage.
- Que-5(b) Answer any two questions out of three. (14)
 (1) Write a note on
 (i) Zink-Silver accumulator.
 (ii) Lead accumulator.
 (2) Explain the term overvoltage. What are the application of this phenomenon? Explain how hydrogen over potential experimentally?
 (3) (i) Explain elimination of liquid junction potential.
 (ii) The EMF of the concentration cell is 0.0118 volt at 25°C Temp.
 $\text{Pb/PbSO}_4/\text{CuSO}_4 (a_+ = 0.02205) : \text{CuSO}_4 (a_+ = 0.00639)/\text{PbSO}_4/\text{Pb}$.
 Calculate the transference number of Cu^{+2} ion
- *****

M.Sc.(Chem.) Semester - 2 (CBCS) Examination
 May/June-2021 (NEW COURSE)
 Organic Chemistry (CORE)

Marks: 42

Time: 1:30 Hours

Instructions:

1. Figure to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

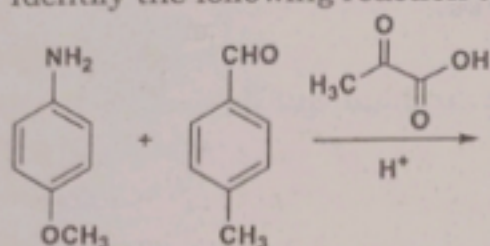
UNIT-1 (14 marks)

Answer ALL questions

Q.1 (a) Answer the following

4 Marks

- (1) What are multicomponent reactions (MCR)? Write its advantages. 2
- (2) Identify the following reaction and write its product.



2

Q.1 (b) Answer any two question out of three.

10 Marks

Describe principle, mechanism and three applications of the following MCR:

- (1) Ugi reaction 5
- (2) Biginelli reaction 5
- (3) Mannich reaction 5

UNIT-2 (14 marks)

Answer ALL questions

Q.2 (a) Answer the following

4 Marks

- (1) What is organocatalyst? Give three examples. 2
- (2) Describe organocatalyzed aldol reaction with one example. 2

Q.2 (b) Answer any two question out of three.

10 Marks

- (1) What is Conjugate addition reaction? Describe various factors affecting conjugate and direct addition reaction with example. 5
- (2) Describe Horner-wadsworth-emmons (HWE) reaction in detail. 5
- (3) Write a note on peterson olefination. 5

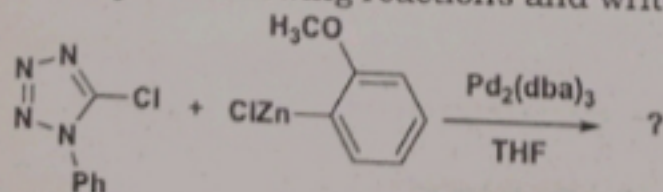
UNIT-3 (14 marks)

Answer ALL questions

Q.3 (a) Answer the following

4 Marks

- (1) Write any four structure of Pd⁽⁰⁾ complexes which are utilized in the C-C cross coupling reaction. 2
- (2) Identify the following reactions and write its appropriate product.



2

Q.3 (b) Answer any two question out of three.

10 Marks

Describe principle, mechanism and two applications of the following Pd-catalyzed reactions:

- | | |
|-----------------|---|
| (1) Suzuki | 5 |
| (2) Heck | 5 |
| (3) Sonogashira | 5 |

UNIT-4 (14 marks)
Answer ALL questions

Q.4 (a) Answer the following

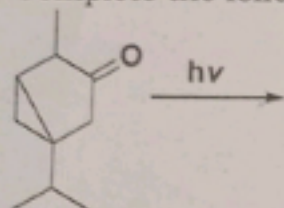
4 Marks

- | | |
|--|---|
| (1) Explain:
(i) Grothurs-draper law
(ii) Stark-Einstein law | 2 |
| (2) Explain Norish type-II cleavages with example. | 2 |

Q.4 (b) Answer any two question out of three.

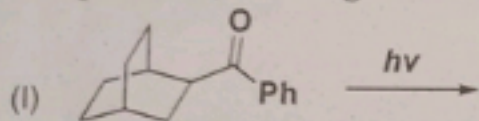
10 Marks

- | | |
|--|---|
| (1) Explain Jablonski diagram in detail. | 5 |
| (2) Complete the following reactions with mechanism: | |

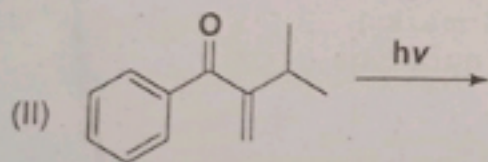


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- | | |
|---|--|
| (3) Complete the following reactions (I & II) with mechanism. | |
|---|--|



5



UNIT-5 (14 marks)
Answer ALL questions

Q.5 (a) Answer the following

4 Marks

- | | |
|---|---|
| (1) Write the chemical structure of the following reagent:
(i) AIBN (ii) TMSCN | 2 |
| (2) Write structure and two application of NBS. | 2 |

Q.5 (b) Answer any two question out of three.

10 Marks

Write chemical structure and at least four applications of following reagent:

- | | |
|-----------|---|
| (1) TEMPO | 5 |
| (2) TBAB | 5 |
| (3) DDQ | 5 |

M.Sc.(Chem.) Semester - 2 (CBCS) Examination

August/September -2020 [NEW COURSE]

Inorganic Chemistry (CORE)

Time: 2:00 Hours

Marks: 56

Instructions:

1. Figure to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any four of the following questions.

Q.1 (a) Answer the following.	4 Marks
(1) Discuss the spin-orbit interaction in atom.	4
Q.1 (b) Answer any two question out of three.	10 Marks
(1) Derive the equation for multiple width large compared to kT and calculate μ_J for Pm^{+3} .	5
(2) Derive Van Vleck equation for susceptibility.	5
(3) Discuss the magnetic properties of actinides.	5
Q.2 (a) Answer the following.	4 Marks
(1) Discuss hydride and dihydrogen ligand containing complexes.	4
Q.2 (b) Answer any two question out of three.	10 Marks
(1) Give reaction and mechanism of Monsanto process.	5
(2) Explain insertion reaction of CO in organometallic chemistry.	5
(3) Discuss the oxidative addition and C-H bond activation in organometallic chemistry.	5
Q.3 (a) Answer the following.	4 Marks
(1) Explain the toxicity and its effects on biological system. Discuss the toxic effect of Cd.	4
Q.3 (b) Answer any two question out of three.	10 Marks
(1) What is importance and deficiency of metal ion? Explain with the help of Mg and Fe.	5
(2) Discuss in detail: Iron-Sulphur protein.	5
(3) Explain metalloporphyrin with its importance and characterization.	5
Q.4 (a) Answer the following.	4 Marks
(1) Discuss the preparation of phosphazene with its physical properties.	4
Q.4 (b) Answer any two question out of three.	10 Marks
(1) Discuss the synthesis of silicone polymers.	5
(2) Explain the preparation, properties and application of borazine.	5
(3) Give the classification of silicates in detail.	5
Q.5 (a) Answer the following.	4 Marks
(1) Give the types and classification of nanomaterials.	4
Q.5 (b) Answer any two question out of three.	10 Marks
(1) Explain the cause of interest in nanomaterials.	5
(2) Discuss the methods of synthesis of inorganic nanomaterials.	5
(3) Explain the characterization of nanoparticles by TEM and AFM.	5