

Reg. No. : .....

Code No. : 41105 E Sub. Code : JMCH 62

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Sixth Semester

Chemistry — Main

ORGANIC CHEMISTRY — IV

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Which of the following is non-reducing carbohydrate?  
(a) Lactose (b) Maltose  
(c) Sucrose (d) Glucose
- A specific test for the identification of carbohydrate group is  
(a) Molisch's test (b) Tollen's test  
(c) Fehling's test (d) Benedict test
- Phenol is a stronger acid than:  
(a) Carbonic acid (b) O-Cresol  
(c) O-Nitro phenol (d) P-Nitro phenol

17. (a) (i) Give the mechanism of Riemer-Tiemen reaction. (5)  
(ii) Gattermann aldehyde synthesis- Explain. (3)

Or

- (b) How will you prepare the following compounds?

- (i) Mandelic acid  
(ii) Anthranilic acid.

18. (a) Give the mechanism of fries rearrangement and Benzidine rearrangement.

Or

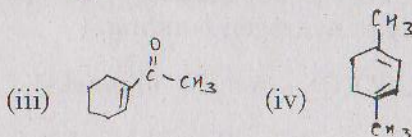
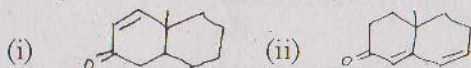
- (b) Discuss the mechanism of any two molecular rearrangement involving migration of a group to electron deficient nitrogen atom.

19. (a) Give the structural elucidation of citral.

Or

- (b) Explain the general methods for the determination of structure of alkaloids.

20. (a) Calculate the  $\lambda_{\max}$  value for the following compounds



Or

- (b) Explain the NMR spectrum of acetone and benzaldehyde.



4. Which of the following compound will give Cannizzaro's reaction?  
 (a)  $\text{CH}_3\text{CHO}$  (b)  $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$   
 (c)  $\text{CH}_3\text{CH}_2\text{CHO}$  (d)  $(\text{CH}_3)_2\text{C}-\text{CHO}$
5. Wolf-rearrangement takes place in the presence of \_\_\_\_\_  
 (a) Cu (b) Li  
 (c) Na (d) Ag
6. Which of the following is an aromatic rearrangement from oxygen to ring carbon atom?  
 (a) Beckmann rearrangement  
 (b) Wolf-rearrangement  
 (c) Fries rearrangement  
 (d) Dakin reaction
7. Number of isoprene units in citral is \_\_\_\_\_  
 (a) 1 (b) 2  
 (c) 3 (d) 4
8. Which one out of the following is not an alkaloid?  
 (a) Menthol (b) Conine  
 (c) Piperine (d) Nicotine
9. Which of the following is an auxochrome  
 (a)  $-\text{OH}$  (b)  $-\text{OR}$   
 (c)  $-\text{NH}_2$  (d) All the above
10.  $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$  contains \_\_\_\_\_ type of promotions-protons  
 (a) One (b) Two  
 (c) Three (d) Four

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Discuss the conversion of glucose to fructose.  
 Or  
 (b) Write any three reactions of sucrose.
12. (a) Explain the acidity of phenol.  
 Or  
 (b) Give the preparation and uses of coumarin.
13. (a) What is Wager-Meerwin rearrangement? Give its mechanism.  
 Or  
 (b) Write the mechanism of Curtius-rearrangement.
14. (a) What are terpenes? Give their classification.  
 Or  
 (b) Give the synthesis of camphor.
15. (a) Define the terms.  
 (i) Chromophore  
 (ii) Auxochrome.  
 Or  
 (b) Discuss the application of IR spectra in the study of hydrogen bonding.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) What is mutarotation? Give its mechanism.  
 Or  
 (b) What is epimerization? Write the epimerization of aldohexose.



(8 pages)

Reg. No. : .....

Code No. : 41099 E      Sub. Code : JMCH 22/  
SMCH 22

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry – Main

ORGANIC CHEMISTRY – I

(For those who joined in July 2016 onwards)

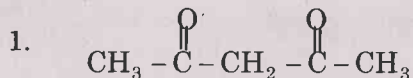
Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :



The IUPAC name of the compound is

- (a) 2,4 – pentanedione
- (b) 1,4 – pentanedione
- (c) 2, 4–dioxypentane
- (d) None of the above

2. The structural formula of 1-ethoxy-1-propanol is

- (a) 
$$\text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \text{OCH}_2\text{CH}_3$$
- (b) 
$$\text{CH}_3 - \text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2\text{CH}_2\text{OH}$$
- (c) 
$$\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2\text{OCH}_2\text{CH}_3$$
- (d) 
$$\text{CH}_3 - \text{CH}_2\text{CH}_2\text{OCH}_2\text{OH}$$

3. Which of the following are weakly deactivating groups in electrophilic substitution reaction?

- (a)  $\text{NH}_2$                                       (b)  $\text{OH}$
- (c)  $\text{Cl}$     (d)  $\text{CF}_3$

4. Choose the correct order of electro negativity

- (a)  $\text{C} < \text{N} < \text{F} < \text{O}$
- (b)  $\text{C} < \text{N} < \text{O} < \text{F}$
- (c)  $\text{C} < \text{F} < \text{O} < \text{N}$
- (d)  $\text{C} < \text{O} < \text{N} < \text{F}$



5. In the presence of peroxide, HBr follows the mechanism

- (a) Ionic mechanism
- (b) Markownikoff's rule
- (c) Free radical mechanism
- (d) None of the above

6.  $(\text{CH}_3)_2\text{C} = \text{CH}_2$   $\xrightarrow[\text{(ii) Oxidation}]{\text{(i) Hydroboration}}$  X. Here 'X' is

- (a)  $(\text{CH}_3)_2\text{CH} - \text{CH}_3$
- (b)  $(\text{CH}_3)_2\text{CH} - \text{CH}_2\text{OH}$
- (c)  $(\text{CH}_3)_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$
- (d)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

7. The boiling point of chloroform is

- (a)  $61^\circ\text{C}$
- (b)  $71^\circ\text{C}$
- (c)  $45^\circ\text{C}$
- (d)  $80^\circ\text{C}$

8. Carbontetra chloride is used as fire extinguisher under the name \_\_\_\_\_

- (a) Styrene
- (b) Pyrne
- (c) Westron
- (d) None of the above

9. Alcohols have high boiling points compared to their corresponding alkanes because of

- (a) Heavy oxygen atom
- (b) Water solubility
- (c) Hydrogen bonding
- (d) None of these

10. Lucas reagent is

- (a)  $\text{HCl}/\text{NaNO}_2$
- (b)  $\text{HCl}/\text{ZnCl}_2$
- (c)  $\text{H}_2/\text{Pd}/\text{H}_2\text{SO}_4$
- (d)  $\text{H}_2/\text{Pd}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is meant by structural isomerism? Explain with examples.

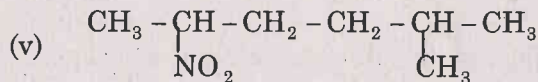
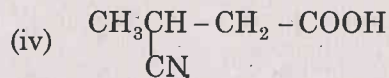
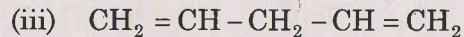
Or

(b) Name the following organic compounds based on IUPAC nomenclature

(i)  $\text{CH}_3\text{C} \equiv \text{CH}$

(ii)  $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{CH}_2 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_3$





12. (a) What is meant by hybridisation? Explain  $\text{sp}^3$  hybridisation.

Or

(b) Explain the stability of olefins with suitable examples.

13. (a) Write down the ozonolysis and hydroboration reactions.

Or

(b) Explain the peroxide effect with example.

14. (a) How is allyl chloride prepared? Give its four properties and two uses.

Or

(b) Explain  $\text{E1}$  mechanism with suitable example.

15. (a) How is Oxirane prepared? Give its uses.

Or

(b) Discuss the importance of Zeisel's method.

PART C — (5 × 8 = 40 marks)

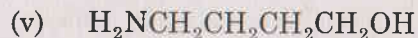
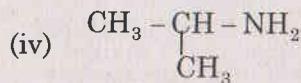
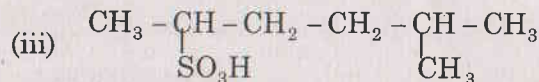
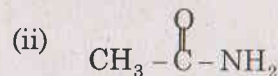
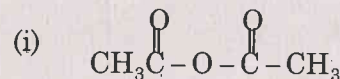
Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

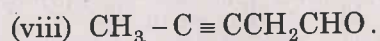
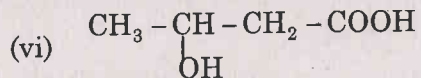
16. (a) How are organic compounds classified based on functional groups? Explain.

Or

(b) Name the following organic compounds based on IUPAC.







17. (a) (i) Discuss the nucleophiles and electrophiles with suitable examples.  
(ii) Explain the inductive effect with suitable example.

Or

- (b) Discuss the electromeric effect and resonance effect with suitable examples.

18. (a) Describe briefly the mechanism of 1,2 and 1,4- addition reactions.

Or

- (b) (i) Discuss the allylic bromination. (4)  
(ii) State and explain Markownik off's rule. (4)

19. (a) Explain  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2$  mechanisms with suitable examples.

Or

- (b) How is chloroprene prepared? Explain its properties.

20. (a) How is allyl alcohol prepared? Explain its properties.

Or

- (b) How are primary, secondary and tertiary alcohol distinguished? Explain them briefly.

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) What are straight fertilizers?  
(ii) Explain nitrogenous and phosphatic fertilizers.  
Or  
(b) What are manures? Give the classification of manures.
17. (a) Give the classification of pesticides according to the mode of application.  
Or  
(b) What are Acaricides? Give the preparation and uses of the following  
(i) DDT (ii) DNOC.
18. (a) Explain the factors favouring soil formation.  
Or  
(b) Explain the components of soil.
19. (a) Explain the ion exchange capacity of organic colloids.  
Or  
(b) What are the sources of soil acidity? Give the characteristics of acidic soil.
20. (a) How will you estimate the available nitrogen of the soil?  
Or  
(b) How will you find out the total organic matter of the soil?

Code No. : 41109 E Sub. Code : JSCH 3 A/  
SSCH 3 A

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Third Semester

Chemistry — Main

Skill Based Subjectss — AGROCHEMISTRY

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

- Nitrogen plays a vital role in \_\_\_\_\_ synthetic.  
(a) protein (b) vitamin  
(c) enzyme (d) none.
- Phosphorous plays a key role in \_\_\_\_\_ metabolism.  
(a) energy (b) ATP  
(c) ADP (d) all the above.
- Toxic chemicals used to kill pests are \_\_\_\_\_  
(a) pesticide (b) fungi  
(c) herbicide (d) none.



PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).  
Each answer should not exceed 250 words.

- 4. Biopesticides are \_\_\_\_\_, used to kill pests.  
(a) micro organisms (b) plant extracts  
(c) small insects (d) above all.
- 5. An agent of chemical weathering is \_\_\_\_\_.  
(a) wind (b) water  
(c) hydration (d) lichens.
- 6. Organic matter constitutes \_\_\_\_\_% of soil.  
(a) 25% (b) 5%  
(c) 20% (d) 50%.
- 7. Soil colloid particles are of \_\_\_\_\_ size.  
(a) 0.002 m (b) 0.02 mm  
(c) 0.2 mm (d) 2 mm.
- 8. Red soil contain  
(a) organic matter (b) humus  
(c) ferric oxide (d) silica.
- 9. Sodic soil is rich is \_\_\_\_\_.  
(a)  $\text{Na}_2\text{CO}_3$  (b)  $\text{NH}_4\text{CO}_3$   
(c)  $\text{NaCl}$  (d) None.
- 10. Water holding capacity of sandy soil is \_\_\_\_\_.  
(a) high (b) low  
(c) medium (d) none.

- 11. (a) Explain the role of the following in plant growth.  
(i) Boran (ii) Copper.  
Or  
(b) Explain the advantages of bio fertilizers over chemical fertilizers.
- 12. (a) Give the preparation of the following :  
(i) Bordeaux mixture  
(ii) DDT.  
Or  
(b) Explain the general methods of application of pesticides.
- 13. (a) What are sedimentary rocks? Give its properties.  
Or  
(b) Classify the igneous rocks based on rate of cooling.
- 14. (a) Explain bulk density and the factors affecting bulk density.  
Or  
(b) What are inorganic colloids? Explain the structure of in organic colloid.
- 15. (a) How will you determine the available phosphorous of the soil?  
Or  
(b) How will you find out the electrical conductivity of the soil?

Reg. No. : .....

Code No. : 41372 E      Sub. Code : SACH 21

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry — Allied — II

ALLIED CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The molecular formula of anthracene is

(a)  $C_6H_{10}$                       (b)  $C_{14}H_{10}$

(c)  $C_{14}H_{14}$                       (d)  $C_{10}H_{10}$

2. All aromatic compounds have

(a) sweet smell

(b) delocalised  $\pi$ -bonds

(c) planar structure

(d) all the above



3. A radioactive element emits  $\alpha$ -particle. The new element has the atomic number comparing to the parent radio isotope element is  
(a) lesser than four (b) greater than four  
(c) greater than two (d) lesser than two
4. Which of the following isotope is used to determine the age of the fossils?  
(a)  $^{14}\text{N}$  (b)  $^{12}\text{C}$   
(c)  $^{14}\text{C}$  (d)  $^{15}\text{N}$
5. \_\_\_\_\_ is used to detect aminoacids.  
(a) Methylene blue (b) Phenolphthalein  
(c) Ninhydrin (d) Methyl orange
6. Which of the following base is not present in DNA?  
(a) Adenine (b) Guanine  
(c) Uracil (d) Thymine
7. The water gas contains  
(a)  $\text{H}_2\text{O}$  and  $\text{N}_2$  (b)  $\text{CO} + \text{H}_2$   
(c)  $\text{O}_2 + \text{H}_2\text{O}$  (d)  $\text{CO} + \text{N}_2$
8. The sodium salt of fatty acid is  
(a) soft soap (b) hard soap  
(c) both (a) and (b) (d) detergent
9. Paracetamol is an example for  
(a) Analgesics (b) Antipyretics  
(c) Both (a) and (b) (d) Antibiotics
10. Keezhanelli is used to cure  
(a) fever (b) diabetes  
(c) jaundice (d) malaria

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write down any five characteristics of aromatic compounds.

Or

- (b) How is naphthalen prepared? Write down its any two chemical properties.

12. (a) Write down the differences between nuclear fission and nuclear fusion.

Or

- (b) State and explain the Soddy's Group displacement law.

13. (a) What are carbohydrates? What are its types? Give example for each type.

Or

- (b) What are the differences between DNA and RNA?

14. (a) Write a note on NPK mixed fertilizers.

Or

- (b) How is glass manufactured?

15. (a) What is meant by antibiotics and antipyretics? Explain with examples.

Or

- (b) Give the importance of Tulsi.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain briefly the structure of benzene.

Or

- (b) Write down the non-benzenoid compounds with suitable examples.

17. (a) What are isotopes? How are they separated by diffusion method?

Or

- (b) Explain briefly the application of isotopes in medicinal field.

18. (a) What are proteins? How are they classified based on their composition and shape?

Or

- (b) Explain the following :

- |                    |         |
|--------------------|---------|
| (i) Nucleic acids  | (3)     |
| (ii) Nucleotides   | (2 1/2) |
| (iii) Nucleosides. | (2 1/2) |

19. (a) What are soaps? Explain their cleansing action.

Or

- (b) Explain the producer gas, gobar gas and LPG.

20. (a) Explain any two examples for air-borne and water-borne diseases for each type.

Or

- (b) What is meant by diabetes? How is it caused? Explain briefly.



(6 pages)

Reg. No. : .....

Code No. : 40289 E

Sub. Code : JACH 21

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Second Semester

Chemistry — Allied

ALLIED CHEMISTRY — II

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

- Which of the following is not an aromatic compound?
  - Benzene
  - Cyclohexane
  - Naphthalene
  - Aniline
- Huckel rule is
  - $(4n + 2)$  rule
  - $(4n - 2)$  rule
  - $n(n + 1)$  rule
  - $\sqrt{n(n + 1)}$  rule

3. Which of the following are isotopes?
- (a)  $^{12}\text{C}$  and  $^{13}\text{C}$       (b)  $^{16}\text{O}$  and  $^{18}\text{O}$   
(c)  $^{14}\text{N}$  and  $^{15}\text{N}$       (d) All the above
4. The method used to separate the isotopes is
- (a) Diffusion method  
(b) Osmosis  
(c) Oxidation method  
(d) None of the above
5. The essential amino acid of the following is                     .
- (a) Alanine      (b) Glycin  
(c) Tyrosine      (d) Tryptophan
6. The non-starch polysaccharides are
- (a) Cellulose and hemicellulose  
(b) Amylose and amylopectin  
(c) Glucose and galactose  
(d) Sucrose and lactose
7. Soap reacts with hard water to form
- (a) Calcium salts      (b) Barium salts  
(c) Sodium salts      (d) Iron salts

8. The reason for adding carboxymethyl cellulose to the washing material is
- (a) for the purpose of drying the washing material
  - (b) removing the dirt fibre
  - (c) it deposits the impurities float on water
  - (d) all the above
9. Chloramphenicol is
- (a) an antiseptic
  - (b) an antibiotic
  - (c) antipyretic drug
  - (d) anti malarial drug
10. The neem bark is used for
- (a) malaria
  - (b) prevents cold
  - (c) liver ailments
  - (d) none of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) What are aromatic compounds? Write down any four general properties of them.

Or

- (b) How are decalin,  $\alpha$ -acetylnaphthalene and  $\alpha$ -nitronaphthalene prepared from naphthalene?



12. (a) Write a note on nuclear stability.

Or

(b) What are isobars and isotones? Explain them with suitable examples.

13. (a) Discuss briefly the artificial sweeteners with suitable examples.

Or

(b) How are proteins classified based on their composition?

14. (a) Explain briefly the cleansing action of soaps and detergents.

Or

(b) How is glass manufactured?

15. (a) What are analgesics? Name any two analgesics and explain them briefly.

Or

(b) Write a note on diabetes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) How are the following obtained from benzene?
- (i) Nitrobenzene
  - (ii) Toluene
  - (iii) Benzene hexachloride
  - (iv) Acetophenone .

Or

- (b) How is benzene prepared? Explain briefly its structure.
17. (a) What are radioactive series? Explain any two radioactive series.

Or

- (b) Explain briefly the applications of radioactive isotopes.
18. (a) How are carbohydrates classified? Explain them with suitable examples.

Or

- (b) What is DNA? Explain its structure.

19. (a) What are gaseous fuel? Discuss briefly the natural gas, producer gas and LPG.

Or

- (b) What are the raw materials of cement? How is cement manufactured?

20. (a) What are infective and hereditary diseases? Mention two examples for each type and explain them.

Or

- (b) Name any three Indian medical plants and explain their importance.
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(6 pages)

Reg. No. : .....

Code No. : 40282 E      Sub. Code : JMCH 41/  
SMCH 41

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fourth Semester

Chemistry — Main

PHYSICAL CHEMISTRY - II

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A process in which there is no exchange of heat between the system and the surroundings is known as

- (a) iso thermal process
- (b) adiabatic process
- (c) iso baric process
- (d) iso choric process

2. Inversion temperature  $T_i =$

- (a)  $\frac{2a}{Rb}$
- (b)  $\frac{Rb}{2a}$
- (c)  $\frac{2b}{Ra}$
- (d)  $\frac{2ab}{R}$

3. In all natural process, the system tends to proceed in the direction of \_\_\_\_\_ randomness

- (a) decreased
- (b) same
- (c) increased
- (d) none

4. The Helmholtz free energy is defined as

- (a)  $A = E - TS$
- (b)  $A = E + TS$
- (c)  $A = H - TS$
- (d)  $A = H + TS$

5. According to Le Chatelier principle, temperature favoure \_\_\_\_\_ reaction

- (a) endothermic
- (b) exothermic
- (c) both
- (d) none

6. The unit of  $K_c$

- (a) atm
- (b) mole  $\text{dm}^{-3}$
- (c) mole<sup>-1</sup>  $\text{dm}^{-3}$
- (d) atm<sup>-1</sup>

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

7. The system with lower C.S.T is
- Phenol-water
  - Triethylamine – water
  - Nicotine – water
  - None
8. Which of the following is a completely miscible system?
- Hel-water
  - Diethylamine – water
  - Nitrobenzene – water
  - Mercury - water
9. Equivalent conductance of an electrolyte \_\_\_\_\_ with dilution
- constant
  - decreases
  - increases
  - none
10.  $CH_3COOH$  is a weak electrolyte because
- it has low vapour pressure
  - it is only partially ionised
  - it completely ionised
  - it has low density

11. (a) Explain the different types of systems with example.

Or

- (b) State and explain Kirchoff's equation. Derive the relationship.

12. (a) Derive an expression for the entropy of mixing of ideal gases.

Or

- (b) Prove that  $-\Delta A$  is a measure of the maximum work done and  $-\Delta G$  is a measure of the net work done by the system.

13. (a) State and explain the law of mass action. Derive the relation between  $K_C$  AND  $K_P$ .

Or

- (b) Derive thermodynamically the law of mass action.

14. (a) State Henry's law. Mention the conditions under which law is valid.

Or

(b) State Raoult's law of ideal solutions. What are the characteristics of an ideal solution?

15. (a) State and explain Debye-Huckel onsager equation.

Or

(b) State and explain Debye-Falkenhagen effect.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the terms  $C_v$  and  $C_p$  of gases and derive the relationship between them.

Or

(b) Explain Joule Thompson effect. Derive the expression for Joule Thompson coefficient.

17. (a) Derive Gibb's Helmholtz equation and explain two of its applications.

Or

(b) Explain the entropy change in isothermal transformation and entropy change accompanying change phase.

18. (a) Derive Van't Hoff's isochore.

Or

(b) State Le Chatlier's principles. Discuss the application of Le Chatlier principle to any two homogeneous equilibrium.

19. (a) What is C.S.T? Discuss about the phenol – water system and explain the effect of sodium chloride on C.S.T. of phenol – water system?

Or

(b) Discuss the principle of fractional distillation.

20. (a) Explain the moving boundary method for the determination of transport number of ions.

Or

(b) Discuss any two applications of conductance measurements.



(6 pages)

Reg. No. : .....

Code No. : 41096 E      Sub. Code : JMCH 11/  
SMCH 11

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

First Semester

Chemistry – Main

INORGANIC CHEMISTRY – I

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Eigen value is the total energy which has
- (a) certain definite and acceptable values
  - (b) all the values
  - (c) zero value only
  - (d) none of the above

2. The electrons in an atom revolve around the nucleus only in selected circular orbits. It was stated by
- (a) Bohr
  - (b) Planck
  - (c) De-Broglie
  - (d) John Dalton
3. Main group elements are
- (a) *s*-block elements only
  - (b) *p*-block elements only
  - (c) both *s*- and *p*-group elements
  - (d) none of the above
4. The element which has the highest atomic radius of the following is
- (a) F
  - (b) Cl
  - (c) Br
  - (d) I
5. The geometry of  $\text{PCl}_5$  is
- (a) Square pyramide
  - (b) Trigonal bipyramide
  - (c) Tetrahedral
  - (d) Octahedral
6. The bond order of  $\text{O}_2$  molecule is
- (a) 1
  - (b) 2
  - (c) 3
  - (d) 0

7. In the periodic table, the position of hydrogen is
- Alkali metals group
  - Alkaline-earth metals group
  - Halides group
  - Inert gases group
8. The element of 'Mg' belongs to the group
- Carbon's group
  - Nitrogen's group
  - Alkali metals group
  - Alkaline-earth metals group
9. The element 'K' belongs to
- Oxygen group
  - Alkali metals group
  - Halides group
  - None of the above
10. An example for interhalogen compounds is
- |                      |          |
|----------------------|----------|
| (a) KCl              | (b) ICl  |
| (c) PCl <sub>5</sub> | (d) NaCl |

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the de-Broglie equation.
- Or
- (b) State and explain Hund's rule.
12. (a) What is meant by electron affinity? Explain how it is varied along the groups and periods in the periodic table.
- Or
- (b) How is electronegativity determined by Mullikan method?
13. (a) State and explain Fajan's rule.
- Or
- (b) Explain  $sp^2d^3$  hybridisation with an example.
14. (a) Explain the position of hydrogen in the periodic table.
- Or
- (b) What are s-block elements? How are they generally occurred?



15. (a) What are silicones? Explain their structures.

Or

(b) What are fluorocarbons? How are they prepared? Write down their technical applications?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What are quantum numbers? What are their types? Explain them.

Or

(b) Write down the Schrodinger wave equation and explain it. Mention its applications.

17. (a) How are atomic radius, ionic radius and ionisation energy changed along the group and period of the periodic table?

Or

(b) What is electronegativity? Explain the factors affecting it. Mention any two applications of electronegativity.

18. (a) Explain the application of Born-Haber cycle with suitable example.

Or

(b) Compare VBT and MOT.

19. (a) What is meant by diagonal relationship? Explain the anomalous behaviour of Li and Be.

Or

(b) Explain the solvation and complexation tendencies of alkali metals with suitable examples.

20. (a) What are carbides? Explain their preparation, properties and technical applications.

Or

(b) What are *p*-block elements? Explain briefly their general characteristic properties.

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Answer ALL questions choosing either (a) or (b).

16. (a) (i) Give the mechanism of MC-Lefferty rearrangement. (5)  
 (ii) What are the advantages of TMS as internal standard in NMR spectroscopy? (3)  
 Or  
 (b) (i) What is chemical shift? (3)  
 (ii) Explain the NMR spectrum of benzene radical. (5)
17. (a) Derive the rate law for first order reaction.  
 Or  
 (b) Write Arrhenius equation. Discuss the determination of 'A' and  $E_a$  from it.
18. (a) (i) State and explain Lewis concept. (5)  
 (ii) What is common-ion effect? (3)  
 Or  
 (b) What are acid-base indicators? Give their application in acid base titration.
19. (a) Define the following terms : (2 + 3 + 3)  
 (i) phase  
 (ii) component  
 (iii) degrees of freedom.  
 Or  
 (b) Explain the phase diagram of magnesium-zinc system.
20. (a) Describe the synthesis of nanoparticles by bottom-up approach.  
 Or  
 (b) Give a detailed study of applications of Nano technology.

Reg. No. : .....

Code No. : 41106 E Sub. Code : JMCH 63

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Sixth Semester

Chemistry — Main

PHYSICAL CHEMISTRY — IV

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. High energy electrons are used as source in \_\_\_\_\_ spectroscopy.  
 (a) Mass (b) IR  
 (c) Raman (d) NMR
2. ESR spectrum of methyl radical contains \_\_\_\_\_ lines.  
 (a) 1 (b) 2  
 (c) 3 (d) 4



3. In a \_\_\_\_\_ order reaction, rate is independent of the concentration of reactants.  
 (a) zero (b) first  
 (c) second (d) third
4. Arrhenius equation is \_\_\_\_\_  
 (a)  $A = ke^{-E_a/RT}$  (b)  $A = -ke^{-E_a/RT}$   
 (c)  $k = Ae^{-E_a/RT}$  (d)  $k = -Ae^{-E_a/RT}$
5.  $\text{pH} + \text{pOH} =$  \_\_\_\_\_  
 (a) 0 (b) 1  
 (c) 7 (d) 14
6. \_\_\_\_\_ is a salt of weak acid and strong base.  
 (a) NaCl (b)  $\text{NH}_4\text{Cl}$   
 (c)  $\text{CH}_3\text{COONa}$  (d)  $\text{CH}_3\text{COONH}_4$
7. For one component system the phase rule is \_\_\_\_\_  
 (a)  $F = 1 - P$  (b)  $F = 2 - P$   
 (c)  $F = 3 - P$  (d)  $F = P - 1$
8. When the solute under goes association in one of the solvent, Nernst distribution law is modified as \_\_\_\_\_  
 (a)  $C_1 = \sqrt{C_2}$  (b)  $C_1 = \sqrt{C_2} K_d$   
 (c)  $C_1 = C_2 K_d$  (d)  $C_1 \times C_2 = K_d$
9. 1 nanometre = \_\_\_\_\_  
 (a)  $1 \times 10^{-9}$  m (b)  $1 \times 10^{-10}$  m  
 (c)  $1 \times 10^{-9}$  cm (d)  $1 \times 10^{-10}$  cm

10. Which of the following is a allotrope of carbon?  
 (a) Graphite (b) Diamond  
 (c) Fullerene (d) All the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

11. (a) Write the differences between IR and Raman Spectroscopy.  
 Or  
 (b) Give the applications of NMR spectroscopy.
12. (a) What are the factors influencing rate of a chemical reaction?  
 Or  
 (b) Compare collision theory with ARRT.
13. (a) What are buffer solutions? Give their types with examples.  
 Or  
 (b) Explain the determination of degree of hydrolysis.
14. (a) Write the thermodynamic derivation of distribution law.  
 Or  
 (b) Explain the phase diagram of sulphur system.
15. (a) Give the properties of metal and metal oxide nanoparticles.  
 Or  
 (b) Explain the magnetic property of nano particles.



(6 pages)

Reg. No. : .....

Code No. : 41100 E      Sub. Code : JMCH 31/  
SMCH 31

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Third Semester

Chemistry — Main

ORGANIC CHEMISTRY — II

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- In Wittig reaction, the aldehyde is converted into  
(a) alkane                      (b) alkene  
(c) alcohol                      (d) carboxylic acid
- Acrolein is obtained from  
(a) Glycol                      (b) Glycerol  
(c) CH<sub>3</sub>CHO                      (d) Ethane

3. Ester on hydrolysis gives

- Acid + alcohol
- Acid + aldehyde
- Acid + amide
- Alcohol + aldehyde

4. During the following reaction, the catalyst used is  
$$\text{RCH}_2\text{COOH} \xrightarrow{?} \text{R}-\underset{\text{Br}}{\text{CH}}-\text{COOH}$$

- Br<sub>2</sub>/H<sub>2</sub>O
- Br<sub>2</sub>/CCl<sub>4</sub>
- Br<sub>2</sub>/P
- Br<sub>2</sub>/CH<sub>3</sub>COOH

5. In Reformatsky reaction, carbonyl compounds are converted into

- acid
- alcohol
- halogen
- α-haloesters

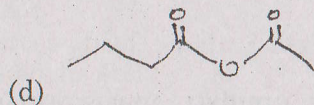
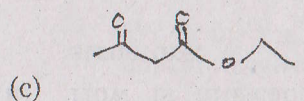
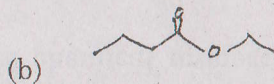
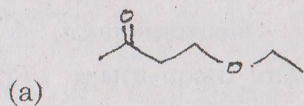
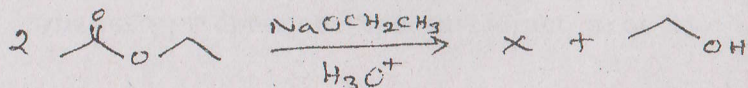
6. The compound obtained during the condensation of acetone and mercaptan is

- sulphonal
- mustard gas
- sulphones
- thioethers



7. Which one is treated with ethanol to form ethylacetoacetate?
- Diketone
  - Diketene
  - Diacetal
  - Acetoacetic ester

8. In the following reaction, X-represents



9. The molecular formula of civetone is

- $\text{C}_{19}\text{H}_{30}\text{O}$
- $\text{C}_{17}\text{H}_{30}\text{O}$
- $\text{C}_{17}\text{H}_{30}\text{O}_2$
- $\text{C}_{19}\text{H}_{30}\text{O}_2$

10. Which of the following lists the conformations of cyclohexane in order of increasing energy?
- Chair < boat < twist < half-chair
  - Half-chair < boat < twist < chair
  - Chair < twist < half-chair < boat
  - Chair < twist < boat < half-chair

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the mechanism of nucleophilic addition reaction using  $\text{NaHSO}_3$ .

Or

- (b) What is MPV reduction? Write its mechanism.

12. (a) How is oxalic acid obtained? Give any two of its properties and uses.

Or

- (b) Explain the Hell-Volhard-Zelinsky reaction.

13. (a) Write a note on Reformatsky reaction and its mechanism.

Or

- (b) Give the preparation and properties of sulphones.



14. (a) Explain briefly the mechanism of oxime-nitroso tautomerism.

Or

(b) Write the preparation methods of diethyl malonate and ethylacetoacetate.

15. (a) How is muscone synthesised? Explain its structure.

Or

(b) Write down any five chemical properties of cycloalkanes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain briefly the relative reactivities of aldehydes and ketones.

Or

(b) Write down the preparation, properties and uses of chloral.

17. (a) Discuss the action of heat on hydroxyacids with suitable examples.

Or

(b) Explain the mechanism of esterification and esterhydrolysis.

18. (a) Write any three chemical reactions of methyl lithium and tetraethyl lead.

Or

(b) Write a note on sulphonal and thioethers.

19. (a) What is meant by tautomerism? Explain the amido-imidic and keto-enol tautomerism with suitable examples.

Or

(b) Explain briefly the synthetic uses of diethyl malonate and ethylacetoacetate with suitable examples.

20. (a) State and explain briefly the Sachse-Mohr theory.

Or

(b) (i) Write down the preparation and structure of civetone. (4)

(ii) Write a note on the relative stability of cycloalkanes. (4)

(6 pages)

Reg. No. : .....

Code No. : 41116 E      Sub. Code : JNCH4 B/  
SNCH4 B

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry

Non Major Elective — APPLIED CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- The scientific term for 'water-hating is'
  - hydroxide
  - hydrophilic
  - hydrophobic
  - None of the above
- Detergents are synthetic soaps like cleansing agents and are also known as
  - artifacts
  - detritus
  - syndets
  - collagen

3. Another mineral other than nitrogen essential for plants is
- (a) lithium                      (b) sodium  
(c) phosphorous                (d) uranium
4. Excess of nitrogen fertilizers leads to
- (a) Pest problems                (b) growth problems  
(c) fruiting problems        (d) flowering problems
5. Polymerisation of formaldehyde with urea or melamine
- (a) Alkyd                        (b) Amino  
(c) Phenolic                    (d) Epoxy
6. \_\_\_\_\_ tubes are good substitutes for human blood vessels in artery by -pass operation
- (a) PVC                            (b) Teflon or decron  
(c) Polythene                    (d) Polystyrene
7. Aspirin is
- (a) Methyl salicylate  
(b) Sodium salicylate  
(c) Acetyl salicylic acid  
(d) O, P-aminophenol



8. \_\_\_\_\_ does of solution of hydrogen peroxide is used as mouth wash
- (a) 0.6-1.2%                      (b) 0.2-0.5%  
(c) 0.8-1.6%                      (d) 1.8-2.0%
9. The substance used as an absorbent in Talcum powder preparation is
- (a) Boric acid                      (b) Acetic acid  
(c) Formic acid                      (d) Sulphuric acid
10. Red inks are
- (a) basic                      (b) acidic  
(c) neutral                      (d) amphoteric

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Define soaps. What are the raw materials used in the manufacture of soap? Mention the uses of the raw materials.

Or

- (b) Explain the cleansing action of soap.

12. (a) What are the characteristics of a good fertilizers?

Or

- (b) What are biofertilizers? Explain their advantages with suitable examples.
13. (a) What is vulcanisation? Explain its significance in detail.

Or

- (b) What are plastics? What are their types? Write down the differences between them.
14. (a) What are alums and epsom salt? Write down their therapeutic uses.

Or

- (b) What are haematinic drugs? Explain them with suitable examples.
15. (a) What are the raw materials present in tooth powder? How is it prepared from the raw materials? Explain briefly.

Or

- (b) Mention raw materials present in moth balls and phenyl. How are they prepared from their raw materials?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What are detergents? How are they classified? Explain their types with suitable examples.

Or

- (b) Distinguish the differences between soaps and detergents. Explain the advantages of detergents over soaps.

17. (a) How are the following fertilizers manufacture prepared?

(i) urea

(ii) Triple superphosphate.

Or

- (b) What are the mixed fertilizers? Explain briefly the preparation and uses of any two mixed fertilizers.

18. (a) Explain the preparation and therapeutic uses of aspirin, paracetamol and tetracyclines.

Or

- (b) Give examples for antacids, sedative and mouth washes. Write down briefly how they are prepared.



19. (a) Describe the preparation uses of quick fix, fevicol and lakelite.

Or

- (b) Write down the preparation and uses of

(i) Polystyrene

(ii) PVC

(iii) Silicone rubber

(iv) Nylon 66.

(4 × 2 = 8)

20. (a) What are the raw materials for writing inks, boot polish and agar batt is? How are they prepared from them?

Or

- (b) How are gum paste, talcum powder and chalk crayons prepared from their raw materials?
-







8. The process of heating the ore strongly in excess of air is called
- (a) electrolysis method
  - (b) roasting
  - (c) froth floatation method
  - (d) concentration method
9. The non-interfering ion is
- (a) phosphate
  - (b) oxalate
  - (c) fluoride
  - (d) sulphate
10. The amount of oxalic acid required to prepare 1N oxalic acid in one litre is
- (a) 6.3 g
  - (b) 126 g
  - (c) 63 g
  - (d) 12.6 g

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Write down the general physical properties of noble gases.

Or

- (b) Explain the uses of Clathrate compounds in details.

12. (a) Explain the Wilkinson's catalyst and its importance.

Or

- (b) What is Prussian blue? How is it prepared? Mention its uses.
13. (a) Give the preparation properties and two uses of thorium nitrate.

Or

- (b) Explain the oxidation states of f-block elements.
14. (a) Explain the magnetic separation method with diagram.

Or

- (b) Write a note on the mineral wealth of India.
15. (a) Explain the minimisation of errors.

Or

- (b) What is meant by precipitation? Explain the conditions for precipitation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Explain the structures of  $\text{XeF}_2$ ,  $\text{XeF}_4$  and  $\text{XeF}_6$ .

Or

- (b) Explain any two methods of separation of noble gases from the atmosphere.

17. (a) Explain the general properties of vanadium group elements.

Or

- (b) How are the following prepared? Explain their importance.

(i) Ziegler-Natta catalyst

(ii) Sodium nitroprusside. (5+5)

18. (a) How are lanthanides separated by ion-exchange and solvent extraction methods?

Or

- (b) Describe in detail the preparation, properties and uses of uranium hexafluoride.



19. (a) Write down the ores of thorium. How is thorium extracted from its important ore?

Or

- (b) Explain briefly the zone refining method and van Arkel-de Boer's method with suitable example.
20. (a) Explain in detail the following:
- (i) Molarity
  - (ii) Normality
  - (iii) Molality. (3+3+2=8)

Or

- (b) Discuss the acid-base and iodometric titrations with suitable examples.
-

(7 pages)

Reg. No. : .....

Code No. : 41107 E      Sub. Code : JACH 11/  
SACH 11

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

First/Third Semester

Chemistry – Allied

ALLIED CHEMISTRY – I

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following hydrogen bond is the strongest?
- (a) O-H...N                      (b) F-H...F  
(c) O-H...O                      (d) O-H...F

2. The hybridisation involved in  $\text{NH}_3$  is
- (a)  $\text{sp}^3$                               (b)  $\text{sp}^3\text{d}$   
(c)  $\text{sp}^3\text{d}^2$                           (d)  $\text{sp}^2$
3. The two types of polar addition reactions are
- (a) free radical and electrophilic  
(b) electrophilic and nucleophilic  
(c) cycloaddition and free radical  
(d) cycloaddition and nucleophilic
4. The non-polar addition reactions are
- (a) Free-radical and electrophiles  
(b) Electrophiles and nucleophiles  
(c) Free radicals and cycloaddition  
(d) Cycloaddition and nucleophiles
5. \_\_\_\_\_ stops as soon as the incident radiation cut off.
- (a) fluorescence  
(b) phosphorescence  
(c) chemiluminescence  
(d) none of the above



6. Which of the following is a cross-linked polymer?
- (a) Bakelite
  - (b) Polythene
  - (c) Nylon 66
  - (d) Polyester
7. The glow of fire fly is due to the aerial oxidation of luciferin. This is an example for what?
- (a) Fluorescence
  - (b) Phosphorescence
  - (c) Chemiluminescence
  - (d) None of the above
8. Which of the following is synthetic rubber?
- (a) Buna-N
  - (b) Buna-S
  - (c) Neoprene
  - (d) All of the above

9. The solid lubricant is
- (a) Petroleum
  - (b) Graphite
  - (c) Formalin
  - (d) Sand
10. Grease is
- (a) Vaseline
  - (b) Vanillin
  - (c) Cystein
  - (d) Adenine

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the hybridisation involved in  $H_2O$  and its structure.
- Or
- (b) What is covalent bond? Explain it with suitable example.



12. (a) What is free radical? How is it produced? Explain its properties.

Or

- (b) Write a note on reaction intermediates.

13. (a) How is quantum yield determined?

Or

- (b) What is meant by bioluminescence? Explain briefly.

14. (a) How are polyacrylonitrile and polystyrene prepared?

Or

- (b) Explain the thermoplastics and thermosetting plastics in detail.

15. (a) How is boot polish prepared from its raw materials?

Or

- (b) Write a note on semi-solid lubricants.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the hybridisation involved and geometry of  $IF_5$ ,  $Br_3$  and  $C_2H_4$ .

Or

- (b) Explain the following : (3 + 2 + 3)

(i) Pauli's exclusion principle

(ii) Aufbau principle

(iii) Hund's rule.

17. (a) Explain briefly the addition and elimination reactions with suitable examples.

Or

- (b) How are carbonium ion and carbanion produced? What are their properties?

18. (a) Describe briefly the laws of photochemistry.

Or

- (b) Discuss the thermoluminescence and phosphorescence with suitable examples.

19. (a) What are polymers? What are their two types? Explain them with suitable examples.

Or

- (b) How are Buna-S, Buna-N and neoprene prepared? Give their uses?

20. (a) How are Chalk piece, tooth powder and nail polish prepared from their raw materials?

Or

- (b) What are lubricants? How are they classified? What are the criteria for a good lubricant?
-



PART C — (5 × 8 = 40 marks)

Reg. No. : .....

Answer ALL questions choosing either (a) or (b).

Code No. : 41121 E      Sub. Code : JMCH 6 A

Each answer should not exceed 600 words.

16. (a) Explain the addition and elimination reaction with its atom economy.

Or

(b) Explain the scope of green chemistry.

17. (a) Explain the application of supercritical CO<sub>2</sub>.

Or

(b) Explain the polymer supported reagents in green synthesis.

18. (a) Explain the green base catalytic reaction with examples.

Or

(b) Explain the microbial oxidation process.

19. (a) Explain the green synthesis of ibuprofen and paracetamol.

Or

(b) Explain the ultrasound assisted coupling and Cannizzaro reaction.

20. (a) Explain the versatile bleaching agents.

Or

(b) Explain the biomimetic multifunctional reagents.

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Sixth Semester

Chemistry — Main

Major Elective — GREEN CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.



Choose the correct answer :

- In green chemistry risk =  
(a) f (Hazard, Exposure)  
(b) f (reactant, Hazard)  
(c) f (Exposure, product)  
(d) f (reactant, product)
- In rearrangement reaction atom economy is  
(a) 100%                      (b) 36%  
(c) 50%                        (d) 0%
- Most commonly used SCF is  
(a) Water                      (b) CO<sub>2</sub>  
(c) NH<sub>3</sub>                        (d) CH<sub>4</sub>



Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

4. In dimethyl carbonate reaction ————— is not produced  
 (a) H<sub>2</sub>O (b) Inorganic acid  
 (c) Inorganic base (d) Inorganic salts
5. In photochemical reaction photosensitizer supply  
 (a) N<sub>2</sub> (b) H<sup>+</sup>  
 (c) O<sub>2</sub> (d) OH<sup>-</sup>
6. ————— is useful for the hydrolysis of N-acylamino-acid  
 (a) H<sup>+</sup> (b)  $\overline{OH}$   
 (c) Lipase (d) amidage
7. Catechol is prepared from  
 (a) CH<sub>4</sub> (b)   
 (c)  (d) C<sub>2</sub>H<sub>6</sub>
8. Wavelength of microwave is  
 (a) 1 cm – 1 m (b) 1 μm – 1 cm  
 (c) 1 nm – 1 μm (d) 400 nm – 800 nm
9. Chlorinated furons are —————  
 (a) Drugs (b) Anesthetics  
 (c) Carcinogens (d) Anti cancer drugs
10. Levulinic acid is obtained from  
 (a) Dyes  
 (b) Organic compounds  
 (c) Biomass  
 (d) Inorganic compounds

11. (a) What is atom economy? Explain with in example.  
 Or  
 (b) Write note on enantioselectivity.
12. (a) What is supercritical fluid extraction? Give its basic principle.  
 Or  
 (b) Write note on Dimethyl carbonate as green reagent”.
13. (a) Write note on green acid catalytic reaction.  
 Or  
 (b) Write note on mesoporous supports by liquid crystal templating.
14. (a) How to prepare adipic acid from benzene?  
 Or  
 (b) In green chemistry how will you oxidise toluene and primary alcohol?
15. (a) Write a note on starting material for green chemistry process.  
 Or  
 (b) Write note on combinatorial green chemistry.



(7 pages)

Reg. No. : .....

Code No. : 41101 E      Sub. Code : JMCH 41/  
SMCH 41

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry — Main

PHYSICAL CHEMISTRY — II

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

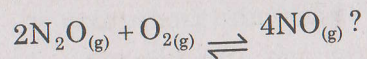
Choose the correct answer.

1. Thermodynamics is applicable to
- (a) Microscopic systems only
  - (b) Macroscopic systems only
  - (c) Homogeneous systems only
  - (d) Heterogeneous systems only

2. A closed system is one which cannot transfer matter but transfer—~~to~~ and from its surroundings.
- (a) heat
  - (b) work
  - (c) radiation
  - (d) all of the above
3. A process which proceeds of its own without any outside assistance is called
- (a) Non-spontaneous process
  - (b) Spontaneous process
  - (c) Reversible process
  - (d) Irreversible process
4. Entropy is a measure of \_\_\_\_\_ of the molecule of the system.
- (a) concentration
  - (b) velocity
  - (c) zig-zag motion
  - (d) randomness
5. Equilibrium reactions are characterised by
- (a) going to completion
  - (b) being non-spontaneous
  - (c) the presence of both reactants and products
  - (d) both (a) and (b)



6. What is the expression for  $K_{eq}$  for the reaction



- (a)  $\frac{[\text{N}_2][\text{O}_2]}{[\text{NO}]}$       (b)  $\frac{[\text{NO}]^4}{[\text{N}_2\text{O}]^2}$   
(c)  $\frac{[\text{N}_2\text{O}]^2[\text{O}_2]}{[\text{NO}]^4}$       (d)  $\frac{[\text{NO}]^4}{[\text{N}_2\text{O}]^2[\text{O}_2]}$

7. The completely miscible solution can be separated by

- (a) a separating funnel  
(b) evaporation  
(c) fractional distillation  
(d) none of these

8. In one mole solution which contains 0.5 mole of solute, then the mass of the solvent is

- (a) 1000 g      (b) 1000 ml  
(c) 500 ml      (d) 500 g

9. One which decreases with dilution is

- (a) conductance  
(b) specific conductance  
(c) equivalent conductance  
(d) none of the above

10. Which relationship is used for the determination of degree of dissociation of weak electrolytes?

- (a)  $\alpha = \frac{\Lambda_m^0}{\Lambda_m}$       (b)  $\alpha = \frac{\Lambda_m}{\Lambda_m^0}$   
(c)  $\frac{\Lambda_0}{\Lambda_m^0}$       (d)  $\frac{\Lambda_m^0}{\Lambda_0}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) State and explain the zeroth law of thermodynamics.

Or

(b) Explain the following :  $(2\frac{1}{2} + 2\frac{1}{2})$

- (i) Enthalpy  
(ii) Internal energy.

12. (a) Discuss the conditions of equilibrium and spontaneity.

Or

(b) Define entropy. Explain the physical significance of entropy.



13. (a) Derive the expression of temperature dependent equilibrium constant.

Or

- (b) What will be the effect of addition of inert gas on the equilibrium constant?

14. (a) Explain the following :  $(2\frac{1}{2} + 2\frac{1}{2})$

- (i) Raoult's law  
(ii) CST.

Or

- (b) What is the molarity of a solution prepared by dissolving 75.5 g of pure KOH in 540 ml of solution?

15. (a) Explain the following :  $(1 + 2 + 2)$

- (i) Equivalent conductance  
(ii) Molar conductance  
(iii) Ionic product of water.

Or

- (b) Explain any one method to determine the transport number.

PART C —  $(5 \times 8 = 40 \text{ marks})$

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What do you understand by  $C_P$  and  $C_V$  of gases? Why is the value of  $C_P$  always greater than that of  $C_V$ ? How are they related?

Or

- (b) What is Joule-Thomson coefficient? Derive the expression for Joule-Thomson coefficient.

17. (a) What is meant by Clausius inequality? Explain it with suitable example.

Or

- (b) (i) Define Gibbs free energy and explain briefly. (4)  
(ii) Give an account of any one applications of Gibbs-Helmholtz equation. (4)

18. (a) Derive an expression to show how the equilibrium constant of a reaction varies with the change of pressure.

Or

- (b) (i) Write a short note on Le-Chatelier's principle. (4)
- (ii) Derive the relationship between  $K_P$  and  $K_C$ . (4)
19. (a) (i) Define and explain mole fraction. (3)
- (ii) Calculate the molality of a solution prepared by dissolving 5.0 g of toluene in 225 g of benzene. (5)

Or

- (b) What are liquid crystals? What are their types? Explain briefly any four applications of the liquid crystals.
20. (a) (i) Define Cell constant. How is it determined? (4)
- (ii) Explain any two applications of conductance measurements. (4)

Or

- (b) What are conductometric titrations? What are their types? Explain them in detail.
-



(6 pages)

Reg. No. : .....

Code No. : 41102 E      Sub. Code : JMCH 51

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fifth Semester

Chemistry – Main

ORGANIC CHEMISTRY – III

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Isomers that can be interconverted through rotation around single band are
  - (a) Conformers
  - (b) Enantiomers
  - (c) Functional isomers
  - (d) Optical isomers

2. In Fischer projection formula if identical groups are on the same side of the single band, it is called as \_\_\_\_\_.
  - (a) Throse
  - (b) Erythrose
  - (c) Cis
  - (d) Trans
3. Cis – trans isomerism is shown by
  - (a) Stilbene
  - (b) Lactic acid
  - (c) Saturated monocarboxylic acid
  - (d) None
4. The most preferred conformation of cyclohexane is
  - (a) Halfchair
  - (b) Boat
  - (c) Chair
  - (d) Twist boat
5. How many  $\pi$  electrons are present in azulene?
  - (a) 6
  - (b) 10
  - (c) 14
  - (d) 18
6. Ortho dibromobenzene on nitration gives
  - (a) three isomers
  - (b) two isomers
  - (c) one isomers
  - (d) none



7. The reagent used in Chichibabin reaction is

- (a) Sodamide (b)  $\text{NH}_3$   
(c) NaOH (d) Sodalime

8. Which of the following is the strongest base?

- (a) pyridine (b) pyrrole  
(c) piperidine (d) aniline

9. Which of the following is an anthraquinone dye?

- (a) Alizarin (b) Indigo  
(c) Malachite green (d) Picric acid

10. Nitronaphthalene on oxidation gives

- (a) Phthalic acid  
(b) Phthalic anhydride  
(c) Nitrophthalic acid  
(d) None

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain asymmetric synthesis with suitable example.

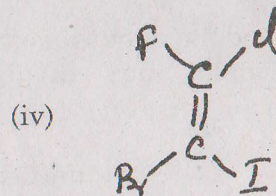
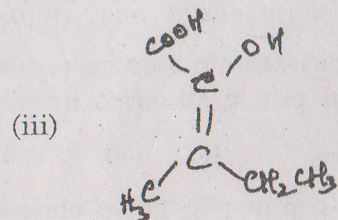
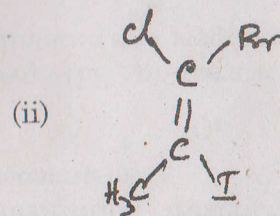
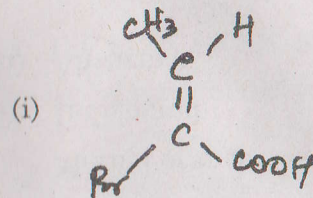
Or

(b) Explain the elements of symmetry with examples.

12. (a) Explain geometrical isomeric compounds using olefins and oximes.

Or

(b) Derive E, Z notation





13. (a) Explain the mechanism of sulphonation.

Or

(b) Explain the methods of find the orientation in disubstituted benzene.

14. (a) Explain Fischer – indole synthesis of indole. Give the electrophilic substitution reactions of indole.

Or

(b) Compare the aromatic character of pyrrole, Furan and Thiophene.

15. (a) How will classify dyes based on the method of application?

Or

(b) Explain the reduction reactions of naphthalene and anthracenes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Draw the Fischer, Newmann and Sawhorse models for meso – tartaric acid.

(ii) Explain D, L notation with examples.

Or

(b) Explain the optical activity of compounds not containing asymmetric carbon.

17. (a) Explain the conformational analysis of 1, 2-dihaloethane using potential energy diagram.

Or

(b) Explain the conformational analysis of cyclohexane using potential energy diagram.

18. (a) Explain aromatic nucleophilic substitution reaction using  $S_N1$  and  $S_N2$  mechanism.

Or

(b) Explain ortho-para and meta director with their electronic interpretation.

19. (a) Explain the preparation and electrophilic substitution reactions of pyridine with mechanism.

Or

(b) Give the preparation and properties of quinoline and isoquinoline.

20. (a) Give the preparation and uses of

(i) Methyl orange

(ii) Indigo and

(iii) Alizarin.

Or

(b) Discuss the structure of naphthalene.

(6 pages)

Reg. No. : .....

Code No. : 40281 E      Sub. Code : JMCH 31/  
SMCH 31

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry — Main

ORGANIC CHEMISTRY – II

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In the reaction of aldehyde and ketone, the carbonyl carbon is mostly attacked by
- (a) electrophiles                      (b) free radicals
- (c) nucleophiles                      (d) carbenes



2. Aldol condensation provides a useful route for the preparation of
- (a)  $\alpha, \beta$ -unsaturated compounds
  - (b)  $\beta$ -unsaturated compounds
  - (c)  $\alpha$ -unsaturated compounds
  - (d) none of the above
3. Citric acid reacts with  $H_2S_2O_7$  to give
- (a) Aconitic acid
  - (b) Iso citric acid
  - (c) Acetone
  - (d) Mesoconic acid
4.  $RCOONH_4 \xrightarrow{\Delta} X$ . Here 'X' is
- (a)  $R\overset{\cdot\cdot}{C}NH_4$
  - (b)  $RCH_2OH$
  - (c)  $RCOOCH_3$
  - (d)  $RCOONH$
5. Which of the following organometallic compound reacts with ethylene to give a polymer?
- (a)  $RMgX$
  - (b)  $R_2Zn$
  - (c)  $R_2CuLi$
  - (d)  $R-Li$
6. Grignard reagent reacts with ketone followed by acid hydrolysis to give alcohol of the type
- (a)  $1^\circ$
  - (b)  $2^\circ$
  - (c)  $3^\circ$
  - (d) None of the above

7. The reaction used to prepare ethylacetate is
- (a) Aldol condensation
  - (b) Claisen condensation
  - (c) Knoevenagel condensation
  - (d) Reimer-Tiemann reaction
8. If an organic compound exhibits tautomerism, it must possess atleast
- (a)  $\alpha$ -hydrogen atom (b)  $\alpha$ -hydroxy group
  - (c)  $\beta$ -hydrogen atom (d)  $\beta$ -hydroxy group
9. The most stable conformation of cyclohexane is
- (a) boat (b) chair
  - (c) half-chair (d) none of the above
10. On refluxing with Zn and NaI, 1, 3-dichloropropane gives
- (a) cyclobutane (b) cyclopentane
  - (c) cyclopropane (d) cyclohexane

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Give the preparation, any two properties and uses of acrolein.

Or

- (b) What is the product obtained when aldehydes reacts with HCN? Write down its mechanism.

12. (a) How is citric acid obtained? Write down its any three properties.

Or

- (b) What are amides? How is urea prepared? Write down its structure?

13. (a) What are sulphones? How are they prepared?

Or

- (b) What is meant by reformatsky reaction?

14. (a) Explain briefly the oxime-nitroso tautomerism.

Or

- (b) Explain any three uses of diethyl malonate.



15. (a) Explain briefly the Sachse-Mohr theory.

Or

- (b) Explain Coulson and Moffit's concept.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss briefly the Meerwein Ponndorf Verley reduction.

Or

- (b) How is succinaldehyde prepared? Give its four properties and four uses.

17. (a) Write down the preparation, properties and uses of lactic acid.

Or

- (b) Explain briefly the esterification and ester hydrolysis with mechanism.

18. (a) Explain the preparation and properties of Thioethers.

Or

- (b) How is Grignard reagent prepared? Explain its any three uses.

19. (a) Write down the preparation and uses of ethyl acetoacetate.

Or

- (b) Explain the keto-enol and amido imido tautomerisms with suitable examples.

20. (a) Write a note on the relative stabilities of cycloalkanes.

Or

- (b) Explain briefly the Baeyer's strain theory with suitable example.
-

(7 pages)

Reg. No. : .....

Code No. : 40283 E      Sub. Code : JMCH 51/  
SMCH 51

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fifth Semester

Chemistry — Main

ORGANIC CHEMISTRY – III

(For those who joined in July 2016 onwards)

Time : Three hours                      Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer

1. dl can also be represented by

- (a) DL                      (b) RS  
(c) (±)                      (d) dextro

2. Optical Isomerism is shown by \_\_\_\_\_.

- (a) 1 – butanol              (b) 2 – butanol  
(c) 3 – pentanol              (d) 4 – heptanol

3. \_\_\_\_\_ conformation is the dominant conformation of ethane molecule.

- (a) Staggered              (b) Skew  
(c) Eclipsed              (d) None of these

4. Cyclohexane has no \_\_\_\_\_ strain.

- (a) boat                      (b) ring  
(c) chair                      (d) all the above

5. Huckel's rule is not applicable to \_\_\_\_\_.

- (a) Cycloheptatrienyl cation  
(b) Cyclopentadienyl cation  
(c) Cyclopropenyl cation  
(d) All the above

6. Which of the following is the nitrating reagent?

- (a) Conc. HNO<sub>3</sub>  
(b) Conc. HCl  
(c) Conc. H<sub>2</sub>SO<sub>4</sub>  
(d) Conc. HNO<sub>3</sub> + Conc. H<sub>2</sub>SO<sub>4</sub>

7. When heated with sodamid pyridine forms \_\_\_\_\_.

- (a) 2 – Amino Pyridine (b) Piperidine  
(c) Pyrolidine              (d) Picramide



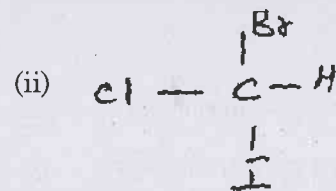
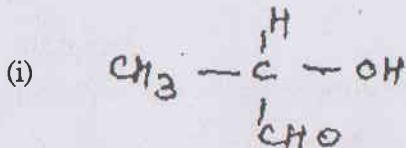
8. Isoquinoline with  $\text{KMnO}_4$  gives \_\_\_\_\_.
- (a) Isoquinoline oxide (b) Quininic acid  
(c) Cinchomeric acid (d) Quinolinic acid
9. Picric acid had \_\_\_\_\_ chromophore.
- (a) 4 (b) 3  
(c) 2 (d) 1
10. What is the colour of the dye that absorbs in the yellow region of visible light?
- (a) Red (b) Blue  
(c) Green (d) Violet

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

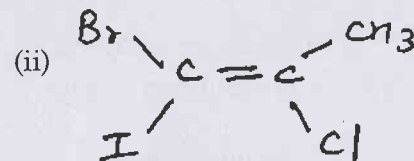
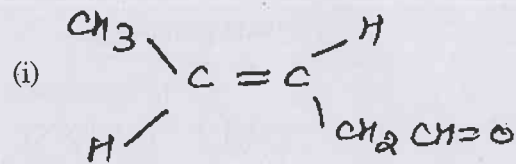
Each answer should not exceed 250 words.

11. (a) Assign R - S notation to the following



Or

- (b) Give an account of the optical activity exhibited by allenes.
12. (a) Assign E - Z notation to the following compounds.



Or

- (b) Discuss the factors which influence the stability of a conformation.

13. (a) State and explain Huckel's rule.

Or

(b) Explain the  $S_Ni$  mechanism with example.

14. (a) Explain the nucleophilic substitution of pyridine.

Or

(b) Suggest a method to synthesise quinoline.

15. (a) State how a triphenyl methane dye is prepared.

Or

(b) What is meant by an aureochrome? Suggest an example.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the optical isomerism of biphenyl compounds.

Or

(b) Explain the following terms with examples

(i) Racemic mixture

(ii) Epimers

(iii) Enantiomers

(iv) Diastereomers

17. (a) Write in detail about assigning configuration to geometrical isomers.

Or

(b) Explain the relative stability of conformers on the basis

(i) Torsional strain

(ii) Steric strain

(iii) Dipole – dipole interaction

18. (a) Give an account of Korner's absolute method.

Or

(b) Explain the mechanism of following.

(i) Halogenation of benzene

(ii) Nitration of benzene

19. (a) Give any four electrophilic substitution reaction for Isoquinoline.

Or

(b) Explain the following synthesis

(i) Bischler – Napieralski synthesis

(ii) Fischer – Indole synthesis

20. (a) How are dyes classified based on their mode of applications? Explain with examples.

Or

(b) Explain the following dyes with examples

(i) Phthalein dyes

(ii) Azo dyes



PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Write a note on Maxwell's distribution of molecular velocities. Explain briefly through diagram, how the molecular velocities change with increase in temperature.

Or

- (b) Explain the postulates of kinetic theory of gases.  
17. (a) Describe the laws of photochemistry briefly.

Or

- (b) What are lasers? Give the principle, types and uses of lasers.

18. (a) Explain briefly the liquid drop model.

Or

- (b) Explain briefly the applications of radioisotopes in the study of reaction mechanism and dating.

19. (a) Explain briefly the seven types of crystal systems.

Or

- (b) What are the important laws of crystallography? Explain them briefly.

20. (a) (i) Write a note on abnormal molecular mass. (4)

- (ii) How is molecular mass determined from elevation of boiling point? (4)

Or

- (b) Explain briefly any two methods to determine the lowering of vapour pressure.

Reg. No. : .....

Code No. : 41097 E      Sub. Code : JMCH 12/  
SMCH 12

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

First Semester

Chemistry — Main

PHYSICAL CHEMISTRY — I

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. For one mole of a gas, the ideal gas equation is  
(a)  $PV = RT$                       (b)  $PV = \frac{1}{2} RT$   
(c)  $PV = 3/2 RT$                       (d)  $PV = 5/2 RT$
2. The mean free path is  
(a) Directly proportional to the pressure of the gas  
(b) Directly proportional to the RMS velocity of gas  
(c) Directly proportional to the temperature of the gas  
(d) Directly proportional to the absolute temperature of the gas



3. In photo chemical reactions, the absorption of light takes place in  
(a) Primary process only  
(b) Secondary process only  
(c) Either primary or secondary process  
(d) Both primary and secondary process
4. The emission of light as a result of chemical action is called  
(a) Phosphorescence (b) Fluorescence  
(c) Chemiluminescence (d) None of the above
5. The half-life of sulfur 35 is 88 days. If 8 g of sulphur-35 exists on day 1, the fraction will remain after 264 days  
(a) 0.5 g (b) 0.4 g  
(c) 0 g (d) 1.0 g
6. The  $\beta$ -particle consists of  
(a) high energy rays  
(b) 1 neutron  
(c) 2 neutrons and 2 protons  
(d) 1 electron
7. Amorphous solid does not have  
(a) Sharp melting point  
(b) Characteristic geometrical  
(c) Regularity of the structure  
(d) All the above
8. NaCl is the example of  
(a) Cubic crystal system  
(b) Tetragonal crystal system  
(c) Orthorhombic crystal system  
(d) None of the above
9. A colligative property depends upon  
(a) Chemical nature of particles  
(b) Size of the particles  
(c) Number of particles  
(d) Temperature of the solution

10. Osmotic pressure can be measured by an instrument called  
(a) Monometer  
(b) Barometer  
(c) Osmometer  
(d) Thermometer

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Define RMS velocity and average velocity? Explain.  
Or  
(b) Discuss the effect of temperature and pressure on the coefficient of viscosity.
12. (a) Write down the differences between thermal and photochemical reactions.  
Or  
(b) Draw the Jablonski diagram and explain it.
13. (a) Write down the differences between nuclear fission and nuclear fusion.  
Or  
(b) Discuss briefly the mass defect and binding energy.
14. (a) What are Frenkel and Schottky defects? Explain in detail.  
Or  
(b) Mention the differences between crystalline and amorphous solids.
15. (a) What is meant by Van't Hoff factor? How is it determined?  
Or  
(b) Define the following (i) Elevation of boiling point (ii) Depression of freezing point (iii) Osmotic pressure. (1 ½ + 1 ½ + 2)

17. (a) How are the isotopes separated by diffusion method?

Or

- (b) (i) What is meant by binding energy? Masses of  ${}^7_3\text{Li}$ ,  ${}^6_3\text{Li}$  and  ${}^1_0\text{n}$  are  $7.016 \mu$ ,  $6.015 \mu$  and  $1.0087 \mu$  respectively. Calculate the binding energy of the neutron in  ${}^7_3\text{Li}$  and MeV. (5)
- (ii) What is meant by mass defect? Explain. (3)

18. (a) How are the proteins classified based on their composition and shape?

Or

- (b) What are carbohydrates? How are they classified? Explain them with suitable examples.

19. (a) What are fuel gases? Discuss briefly the natural gas, producer gas and water gas.

Or

- (b) What are LPG and mixed fertilizers? Explain them in detail.

20. (a) Explain briefly the importance of tulsii, neem and keezhanelli.

Or

- (b) What are hereditary diseases? Mention any two hereditary diseases and explain their causes and prevention.

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Reg. No. 1.....

Code No. : 41108 E Sub. Code : JACH 21

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry

ALLIED CHEMISTRY - II

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following is non-benzenoid aromatic compound?
- (a) cyclopropenyl cation  
(b) cyclopentadienyl anion  
(c) tropylium cation  
(d) all the above
2. Sulphonation of naphthalene with  $\text{H}_2\text{SO}_4$  at  $150^\circ\text{C}$  yields mainly
- (a)  $\alpha$ -Naphthalene sulphonic acid  
(b)  $\beta$ -Naphthalene sulphonic acid  
(c)  $\gamma$ -Naphthalene sulphonic acid  
(d) A mixture of all these
3. Nuclear energy adequately explains the energy of solar system, called
- (a) Stellar energy  
(b) Atomic energy  
(c) Fusion bomb or Hydrogen bomb  
(d) The above said (a) and (c)



4. Which one is used for deducing the mass defect?  
 (a)  $\Delta m = M - A$  (b)  $\Delta m = A + M$   
 (c)  $\Delta m = A - M$  (d)  $\Delta m = (M + A)^2$
5. Carbohydrates are characterised by the presence of  
 (a) -OH group  
 (b)  $\text{>C=O}$   
 (c) Assymmetric carbon  
 (d) All of these
6. Which one of the following amino acids is a basic amino acid?  
 (a) Tryptophan (b) Leucine  
 (c) Histidine (d) Glutamic acid
7. Potassium salts of fatty acids are called  
 (a) detergent (b) soap  
 (c) fertilizers (d) cement
8. The substance which is added for the slow setting of cement is  
 (a) Limestone (b) Sand  
 (c) Gypsum (d) Water
9. Aspirin is used as  
 (a) Analgesics (b) Antipyretics  
 (c) Antibiotics (d) Both (a) and (c)
10. The abnormal high blood glucose level is called  
 (a) hyper glycemica (b) mytoglycemica  
 (c) hypoglycemica (d) phytoglycemica

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) How is benzene prepared? Explain.  
 Or  
 (b) What is meant by aromaticity? Explain with suitable examples.

12. (a) Explain briefly the isobars and isotones with suitable examples.  
 Or  
 (b) What is meant by nuclear fusion? Describe briefly.
13. (a) What is RNA? Explain its various types.  
 Or  
 (b) What are artificial sweeteners? Mention their uses with suitable examples.
14. (a) Discuss the cleansing action of soaps and detergents.  
 Or  
 (b) What are the various types of glass? Mention their uses.
15. (a) What are insect borne and water borne diseases? Give suitable example for each and explain.  
 Or  
 (b) What are sulpha drugs? Write down their uses with suitable examples.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) How is naphthalene prepared? Write down its properties and structure.  
 Or  
 (b) How are the following compounds obtained from benzene?  
 (i) cyclohexane  
 (ii) benzene sulphonic acid  
 (iii) acetophenone  
 (iv) nitrobenzene.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State and explain third law of thermodynamics. Give a brief study of molecules which do not obey the third law of thermodynamics.

Or

- (b) Derive Clapeyron-Clausius equation and mention its importance.

17. (a) Derive an expression for the EMF of concentration cells without transference.

Or

- (b) How will you determine the pH of a solution using Hydrogen electrode?

18. (a) Discuss the kinetics of enzyme catalysed reaction.

Or

- (b) Derive Langmuir adsorption isotherm equation.

19. (a) Explain (i) symmetry element (ii) symmetry operation. List the symmetry elements for the following molecules (i) H<sub>2</sub>O (ii) BF<sub>3</sub>.

Or

- (b) What is point group? Illustrate the point groups of HCl and CO<sub>2</sub>.

20. (a) Discuss the applications of UV spectroscopy.

Or

- (b) Discuss the applications of IR spectroscopy.

Reg. No. : .....

Code No. : 41103 E      Sub. Code : JMCH 52

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fifth Semester

Chemistry — Main

PHYSICAL CHEMISTRY — III

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Each substance in a given state has a tendency to escape from that state and this escaping tendency is named as

- (a) Spontaneity                      (b) Gibbs free energy  
(c) Fugacity                          (d) Activity.

2. The equation for Van't Hoff isotherm is

- (a)  $-\Delta G = 2.303 RT \log K_p$   
(b)  $\Delta G = 2.303 RT \log K_p$   
(c)  $-\Delta G = 2.303 RT^2 \log K_p$   
(d)  $\Delta G = 2.303 RT^2 \log K_p$



3. Calomel electrode is an example of \_\_\_\_\_ electrode.
- metal-metal ion
  - gas
  - metal-metal salt ion
  - oxidation-reduction.
4. In the reaction  $Zn + Cu^{+2} \rightarrow Cu + Zn^{+2}$
- Zn gets oxidised and Cu gets reduced
  - Zn is oxidised and  $Cu^{+2}$  is reduced
  - Zn and  $Cu^{+2}$  both are oxidised
  - Cu is oxidised and Zinc is reduced.
5. Chemical adsorption is \_\_\_\_\_ process.
- reversible
  - irreversible
  - multi layer formation
  - endothermic.
6. At low pressure, the amount of gas absorbed is \_\_\_\_\_ to the pressure.
- directly related
  - inversely related
  - not related
  - all the above.
7. Ammonia molecule is an example for
- Abelian group
  - Non-abelian group
  - Sub-group
  - None of the above.
8. The point group of water molecule is
- $C_{3v}$
  - $C_{2v}$
  - $T_d$
  - $O_h$ .
9. Red shift means
- $n - \pi^*$
  - $\pi - \pi^*$
  - $\sigma - \pi^*$
  - None of these.

10. The molecule which is IR inactive is
- $N_2$
  - $O_2$
  - Both  $N_2$  and  $O_2$
  - HCl.

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive Van't Hoff Reaction isotherm.  
Or  
(b) Derive Gibbs-Duhem equation.
12. (a) What is meant by LJP? How does it arise? How is it eliminated?  
Or  
(b) Derive Nernst equation of electrode potential.
13. (a) Distinguish between physical adsorption and chemisorption.  
Or  
(b) What is phase transfer catalysis? Explain it with suitable examples.
14. (a) Explain the point groups present in Ammonia molecule.  
Or  
(b) Explain proper axis of rotation and improper axis of rotation with examples.
15. (a) Explain Born-Oppenheimer approximation principle.  
Or  
(b) Explain the applications of Microwave spectroscopy.



(6 pages)

Reg. No. : .....

Code No. : 41116 E      Sub. Code : JNCH4 B/  
SNCH4 B

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry

Non Major Elective — APPLIED CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The scientific term for 'water-hating is'  
(a) hydroxide                      (b) hydrophilic  
(c) hydrophobic                    (d) None of the above
2. Detergents are synthetic soaps like cleansing agents and are also known as  
(a) artifacts                        (b) detritus  
(c) syndets                         (d) collagen

3. Another mineral other than nitrogen essential for plants is  
(a) lithium                         (b) sodium  
(c) phosphorous                  (d) uranium
4. Excess of nitrogen fertilizers leads to  
(a) Pest problems                (b) growth problems  
(c) fruiting problems            (d) flowering problems
5. Polymerisation of formaldehyde with urea or melamine  
(a) Alkyd                          (b) Amino  
(c) Phenolic                        (d) Epoxy
6. \_\_\_\_\_ tubes are good substitutes for human blood vessels in artery by -pass operation  
(a) PVC                              (b) Teflon or decron  
(c) Polythene                      (d) Polystyrene
7. Aspirin is  
(a) Methyl salicylate  
(b) Sodium salicylate  
(c) Acetyl salicylic acid  
(d) O, P-aminophenol



8. \_\_\_\_\_ does of solution of hydrogen peroxide is used as mouth wash

- (a) 0.6-1.2%                      (b) 0.2-0.5%  
(c) 0.8-1.6%                      (d) 1.8-2.0%

9. The substance used as an absorbent in Talcum powder preparation is

- (a) Boric acid                      (b) Acetic acid  
(c) Formic acid                      (d) Sulphuric acid

10. Red inks are

- (a) basic                              (b) acidic  
(c) neutral                              (d) amphoteric

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Define soaps. What are the raw materials used in the manufacture of soap? Mention the uses of the raw materials.

Or

(b) Explain the cleansing action of soap.

12. (a) What are the characteristics of a good fertilizers?

Or

(b) What are biofertilizers? Explain their advantages with suitable examples.

13. (a) What is vulcanisation? Explain its significance in detail.

Or

(b) What are plastics? What are their types? Write down the differences between them.

14. (a) What are alums and epsom salt? Write down their therapeutic uses.

Or

(b) What are haematinic drugs? Explain them with suitable examples.

15. (a) What are the raw materials present in tooth powder? How is prepared from the raw materials? Explain briefly.

Or

(b) Mention raw materials present in moth balls and phenyl. How are they prepared from their raw materials?



PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What are detergents? How are they classified? Explain their types with suitable examples.

Or

- (b) Distinguish the differences between soaps and detergents. Explain the advantages of detergents over soaps.

17. (a) How are the following fertilizers manufacture prepared?

(i) urea

(ii) Triple superphosphate.

Or

- (b) What are the mixed fertilizers? Explain briefly the preparation and uses of any two mixed fertilizers.

18. (a) Explain the preparation and therapeutic uses of aspirin, paracetamol and tetracyclines.

Or

- (b) Give examples for antacids, sedative and mouth washes. Write down briefly how they are prepared.

19. (a) Describe the preparation uses of quick fix, fevicol and lakelite.

Or

- (b) Write down the preparation and uses of

(i) Polystyrene

(ii) PVC

(iii) Silicone rubber

(iv) Nylon 66.

(4 × 2 = 8)

20. (a) What are the raw materials for writing inks, boot polish and agar batt is? How are they prepared from them?

Or

- (b) How are gum paste, talcum powder and chalk crayons prepared from their raw materials?



(6 pages)

Reg. No. : .....

Code No. : 40284 E      Sub. Code : JMCH 52/  
SMCH 52

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fifth Semester

Chemistry — Main

PHYSICAL CHEMISTRY — III

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following is Van't Hoff isochore?

(a)  $\frac{d \ln k_p}{dt} = \frac{\Delta H}{Rt^2}$

(b)  $\frac{d \ln p}{dT} = \frac{\Delta H}{RT^2}$

(c)  $\frac{dT}{dP} = \frac{T(V_L - V_S)}{\Delta H_f}$

(d)  $G = H + T \left( \frac{\partial G}{\partial T} \right)_P$

2. "Entropy of the universe is ever increasing". This is the statement of \_\_\_\_\_ thermodynamics.

(a) I law

(b) II law

(c) Zeroth law

(d) III law

3. Which of the following is not a reference electrode?

(a) Hydrogen electrode

(b) Calomel electrode

(c) Silver-Silver chloride electrode

(d) Platinum electrode

4. The liquid junction potential is eliminated by \_\_\_\_\_

(a) Membrane

(b) Filter paper

(c) Salt bridge

(d) Adding *KCl* to the electrolyte

5. Which of the following is Freundlich adsorption isotherm?

(a)  $\frac{w}{m} = kp^n$

(b)  $\frac{w}{m} = \frac{k^n}{p}$

(c)  $y = mp$

(d)  $y = mx + c$

6. Which of the following statement is not true?
- A catalyst changes the rate of reaction
  - A catalyst does not change the equilibrium
  - A catalyst decreases the activation energy of a reaction.
  - A catalyst does not initiate the reaction
7. The symmetry elements present in  $H_2O$  molecule is \_\_\_\_\_.
- E
  - $C_2$
  - $\sigma_v$
  - All the above
8.  $E, C_2, \sigma_h, i$  belongs to \_\_\_\_\_ point group.
- $C_{2v}$
  - $C_{3v}$
  - $C_{2h}$
  - $C_{3h}$
9. The changes taking place in molecules at UV-Visible frequency is \_\_\_\_\_
- Rotation alone
  - Vibration alone
  - Rotation and vibration
  - None of these
10. Which one of the following is used as a solvent in IR spectroscopy?
- $H_2O$
  - KCl
  - KBr
  - TMS

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain any two application of Nernst distribution law.  
Or  
(b) Derive the integrated form of the Clausius-Clapeyron equation.
12. (a) Derive an expression for liquid junction potential.  
Or  
(b) Explain potentiometric redox titration with an example.
13. (a) Derive Michaelis – Menton equation.  
Or  
(b) Write about the applications of adsorption.
14. (a) Explain:  
(i) Point of symmetry  
(ii) Identity element  
Or  
(b) Explain point group present in  $NH_3$  molecule.

15. (a) Describe the applications of rotational spectra for the determination of bond length in diatomic molecules.

Or

- (b) State and explain Franck–Condon principle.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State and explain third law of thermodynamics. Give a brief study of molecules which do not obey the third law of thermodynamics.

Or

- (b) Derive an expression for the variation of chemical potential with temperature and pressure.

17. (a) What is meant by hydrogen over voltage? Explain any three applications of it.

Or

- (b) Give one example each for concentration cell with transfer and without transfer. Derive an expression for emf of a concentration cell with transference.

18. (a) Discuss in detail about adsorption indicators.  
Or

- (b) Give an account of phase transfer catalysis.

19. (a) List the symmetry elements for the following molecules.

(i)  $\text{H}_2\text{O}$

(ii)  $\text{BF}_3$

(iii)  $\text{NH}_3$

Or

- (b) Explain

(i) Abelian group

(ii) Point group

(iii) Non-Abelian group

(iv) Cyclic group

20. (a) Discuss the applications of IR spectroscopy.

Or

- (b) Explain about the theory of UV and visible spectra.
-



(6 pages)

Reg. No. : .....

Code No. : 40285 E

Sub. Code : JMCH 61

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Sixth Semester

Chemistry – Main

INORGANIC CHEMISTRY – III

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Common name for Potassium Diammine Tetranitro Cobaltate (III) is
  - (a) Zeise's salt
  - (b) Edmann's salt
  - (c) Vaska's complex
  - (d) None of the above
2. Which one of the following is not a ambidentate ligand?
  - (a)  $\text{NO}_2^-$
  - (b)  $\text{Cl}^-$
  - (c)  $\text{CN}^-$
  - (d)  $\text{S}_2\text{O}_3^{-2}$

3. Which of the following complex is paramagnetic?
- (a)  $[\text{Co}(\text{NH}_3)_6]^{+3}$       (b)  $\text{K}_4[\text{Fe}(\text{CN})_6]$   
(c)  $[\text{Co}(\text{CN})_6]^{-3}$       (d)  $[\text{Co F}_6]^{-3}$
4. Hybridisation present in tetrahedral complex is
- (a) sp      (b)  $sp^2$   
(c)  $sp^3$       (d)  $sp^3d$
5. Substitution by water is \_\_\_\_\_.
- (a) anation      (b) hydrolysis  
(c) aquation      (d) none of the above
6. The half-life period of labile complexes are
- (a) short      (b) very short  
(c) long      (d) very long
7. The formula for Wilkinson's catalyst is
- (a)  $[\text{Co}_2(\text{CO})_8]$       (b)  $[\text{Rh}(\text{CO})_2\text{I}_2]$   
(c)  $\text{RhCl}(\text{PPh}_3)_3$       (d)  $(\text{C}_2\text{H}_5)_2\text{Zn}$
8. Which one is a metal sandwich complex?
- (a) Grignard reagent      (b) Wilkinson's catalyst  
(c) Ferrocene      (d) Zeises salt

9. Which transition is forbidden?
- (a)  $g \rightarrow g$
  - (b)  $u \rightarrow u$
  - (c)  $g \rightarrow u$
  - (d) none of the above
10. Staggered rules was formulated by
- (a) Adamson
  - (b) Kirk
  - (c) Wilfred
  - (d) Werner

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the following with suitable examples :
- (i) Linkage Isomerism
  - (ii) Polymerisation isomerism.

Or

- (b) Discuss the merits and defects of Valence bond theory.



12. (a) How will you determine the stability constant of a reaction by Bjerrum method?

Or

- (b) Explain the shapes of 'd' orbitals.

13. (a) Write notes on :

- (i) Labile complexes  
(ii) Inert complexes.

Or

- (b) Explain the theory of Trans effect.

14. (a) Write short notes on Metal nitrosyls.

Or

- (b) Explain the preparation of the following compounds :

- (i) Ferrocene  
(ii) Wilkinson's catalyst.

15. (a) Explain Photo isomerisation in detail.

Or

- (b) Write notes on Photovoltaic cell.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the Geometrical Isomerism in square planar complexes with examples.

Or

- (b) Explain the postulates of Valence bond theory.

17. (a) Explain it with examples :

- (i) high spin complexes
- (ii) low spin complexes.

Or

- (b) Explain the applications of crystal field theory and its limitations.

18. (a) Explain oxidation-reduction reactions in detail with examples.

Or

- (b) Explain the terms in detail with examples :

- (i) Aquation
- (ii) Base Hydrolysis
- (iii) Anation reaction

19. (a) Write notes on :
- (i) organometallic copper compounds
  - (ii) organometallic phosphorus compounds.

Or

- (b) Write down the preparation of Ziegler-Natta catalyst and explain its role in the polymerization of ethylene.
20. (a) Explain the process of Quenching in detail.

Or

- (b) Explain the different types of photo chemical reactions in detail.
-



(6 pages)

Reg. No. : .....

Code No. : 41104 E      Sub. Code : JMCH 61

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Sixth Semester

Chemistry — Main

INORGANIC CHEMISTRY – III

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Formulate the complex "Calcium Hexacyanoferrate (II)"

- (a)  $\text{Ca}[\text{Fe}(\text{CN})_6]$       (b)  $\text{Ca}_2[\text{Fe}(\text{CN})_6]$   
(c)  $\text{Fe}[\text{Ca}(\text{CN})_6]$       (d)  $\text{Ca}_3[\text{Fe}(\text{CN})_6]$

2. Oxidation number of Fe in  $\text{K}_4[\text{Fe}(\text{CN})_6]$  is

- (a) 2+      (b) 3+  
(c) 2-      (d) 3-

3. Which of the following system has CFSE value other than zero?

- (a) low spin  $d^6$  octahedral  
(b)  $d^{10}$  octahedral  
(c)  $d^{10}$  tetrahedral  
(d) weak field  $d^5$  octahedral

4. The overall stability constant  $\beta_3$  is related to stepwise stability constant  $K_1$ ,  $K_2$  and  $K_3$  as

- (a)  $\beta_3 = K_1 + K_2 + K_3$   
(b)  $\beta_3 = \frac{K_1 + K_2}{K_3}$   
(c)  $\beta_3 = K_1 \cdot K_2 \cdot K_3$   
(d)  $\beta_3 = K_1 - K_2 - K_3$

5. Labile and inert is \_\_\_\_\_ terms.

- (a) thermodynamic      (b) kinetic  
(c) stability      (d) instability

6. Stable complexes have large \_\_\_\_\_ free energies of reactions.

- (a) positive      (b) negative  
(c) zero      (d) unit

7. Ligands are considered to be Lewis \_\_\_\_\_.
- (a) bases (b) acids  
(c) neutral (d) amphoteric
8. Ziegler-Natta catalyst is
- (a)  $\text{HCo}(\text{CO})_4$  (b)  $[\text{Rh}(\text{CO})_2\text{I}_2]^-$   
(c)  $\text{IrCl}_2$  (d)  $\text{TiCl}_4$
9.  $\Delta G^\circ$  for photochemical cleavage of water into its elements is
- (a) 50 Kcal/mol (b) 57 Kcal/mol  
(c) 150 Kcal/mol (d) 50 Cal/mol
10. In which condition  $AM = 1$
- (a)  $\theta = 30^\circ$  (b)  $\theta = 60^\circ$   
(c)  $90^\circ$  (d)  $180^\circ$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write note on (i) coordination number and (ii) ligands.
- Or
- (b) Write note on geometrical isomerism in square planar complex.

12. (a) Compare the CFSE value of the complexes  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$  and  $[\text{MO}(\text{H}_2\text{O})_6]^{3+}$ .
- Or
- (b) How does CFT explain the colour of coordination complexes?
13. (a) Write the mechanism of aquation reaction in Oh complexes.
- Or
- (b) Write note on trans effect.
14. (a) Explain the EAN and 18 electron rule with example.
- Or
- (b) Write the mechanism of alkene hydrogenation by Wilkinson's catalyst.
15. (a) What is bimolecular quenching? Explain with example.
- Or
- (b) Write a note on photo isomerization in Pt(II) complexes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What are the limitations of VB theory? Explain.

Or

- (b) How to apply VB theory of square planar complexes? Explain with one example.
17. (a) What is CFT? How does the theory account for the fact that  $[\text{CoF}_6]^{3-}$  is paramagnetic but  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic through both are octahedral.

Or

- (b) Derive relationship between stepwise and overall stability constant.
18. (a) Explain the outer sphere electron transfer mechanism.

Or

- (b) Explain the theory of trans effect.

19. (a) Explain the hydroformylation process with mechanism.

Or

- (b) Explain the mansanto acetic acid process.

20. (a) Explain the photoredox reactions of Co(III) complexes.

Or

- (b) Explain the photolytic cleavage of water.
-



Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the different types of addition polymerisation with mechanism.  
Or  
(b) Illustrate with suitable examples how the polymers can be classified on the basis of structure.
17. (a) Explain any four polymer reactions.  
Or  
(b) How is molecular weight of a polymer is determined by number average and weight average methods?
18. (a) Explain (i) Solution polymerisation (ii) suspension polymerisation (iii) Interfacial condensation.  
Or  
(b) Explain moulding and spinning techniques.
19. (a) List out the uses of different for maldehyde resine.  
Or  
(b) Discuss the preparation properties and uses of any two synthetic rubbers.
20. (a) Write notes on (i) Poly pyrrole (ii) Poly sulphur nitrile.  
Or  
(b) Explain the biomedical application of polymers in (i) Artificial kidney (ii) Artificial heat (iii) Artificial blood.

Reg. No. : .....

Code No. : 41117 E Sub. Code : JMCH 5 A

B.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Fifth Semester

Chemistry — Main

Major Elective — POLYMER CHEMISTRY

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Thermoset plastics are formed by  
(a) addition polymerisation  
(b) condensation polymerisation  
(c) oxidation polymerisation  
(d) reduction polymerisation
2. Which of the following is a heteropolymer?  
(a) Nylon (b) polystyrene  
(c) poly thene (d) neoprene
3. Osmometry is used to determine \_\_\_\_\_  
molecular weight  
(a) weight average (b) number average  
(c) viscosity average (d) none



4. What occurs during vulcanization of rubber?  
(a) ring opening (b) cyclisation  
(c) cross-linking (d) group transfer
5. The polymerisation reaction becomes uncontrolled leading to explosion in  
(a) Bulk polymerisation  
(b) Solution polymerisation  
(c) Suspension polymerisation  
(d) Emulsion polymerisation
6. Fibres are made by a process called  
(a) Casting (b) Moulding  
(c) Spinning (d) None
7. Nylon is a  
(a) Polyester fibre (b) Polyamide fibre  
(c) Acrylic fibre (d) Vinyl fibre
8. The copolymer of vinyl chloride and inyidene chloride is called as  
(a) Saran (b) Vinyan  
(c) Modacrylic (d) None
9. Artificial heat is made of  
(a) PMMA (b) PVC  
(c) Poly urethane (d) Poly lactic acid
10. Polypyrrole is an example of  
(a) Conducting polymer  
(b) Silicone resin  
(c) Silicone rubber  
(d) Silicone grease

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Differentiate between addition and condensation polymers with examples.  
Or  
(b) Explain the classification of polymers based on crystallinity.
12. (a) Explain the degradation of polymers by chemical methods.  
Or  
(b) Explain the cross-linking reactions of polymers.
13. (a) What is bulk polymerisation? Write its advantages of disadvantages.  
Or  
(b) Explain the casting methods.
14. (a) Compare the properties of HDPE, LDPE and LLDPE.  
Or  
(b) Give the preparation, properties and uses of styrene rubber.
15. (a) Explain the preparation, classification and properties of silicones.  
Or  
(b) Write a note on artificial skin.

(6 pages)

Reg. No. : .....

Code No. : 40298 E Sub. Code : JMCH 5 A/  
SECH 5 A

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fifth Semester

Chemistry – Main

Major Elective I – POLYMER CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Natural polymer is

- (a) Polyethylene      (b) Teflon  
(c) Cellulose          (d) PVC

2. Copolymers contains atleast \_\_\_\_\_ types of monomers

- (a) One                      (b) Two  
(c) Five                      (d) Three

3. Cross linking in the polymers will \_\_\_\_\_ T<sub>g</sub> value

- (a) increase  
(b) decrease  
(c) not affected  
(d) none of the above

4. Relation between degree of polymerization and number average molecular weight is

- (a)  $DP_n = \frac{M_n}{M_o}$                       (b)  $DP_n = \frac{M_o}{M_n}$   
(c)  $DP_n = \frac{M_n}{T_g}$                       (d) None of the above

5. Emulsion polymerization is a type of \_\_\_\_\_ polymerization

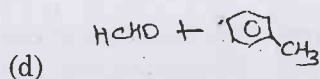
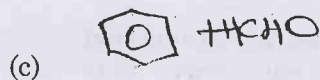
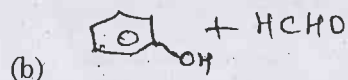
- (a) Cationic                      (b) Anionic  
(c) Radical                      (d) None of the above

6. Polymers are reinforced with \_\_\_\_\_

- (a) Paint                      (b) Fibre  
(c) Wire                      (d) Metal



7. Bakelite is prepared from \_\_\_\_\_ and \_\_\_\_\_



8. Natural rubber is \_\_\_\_\_

(a) Poly styrene

(b) Poly isopropanal

(c) Polyisoprene

(d) Polyvinylchloride

9. Fire resistant polymer is \_\_\_\_\_

(a) Polyethylene (b) Polyimide

(c) PVC (d) PVA

10. \_\_\_\_\_ polypyrrole is conducting polymer

(a) reduced (b) oxydized

(c) wet (d) dry

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write classification of polymer on the basis of physical properties and applications.

Or

(b) Explain thermoplastic and thermosetting polymer with examples.

12. (a) What are the importance of Tg?

Or

(b) Write note on polymer degradation.

13. (a) Explain Bulk and solution polymerization with an example.

Or

(b) Write note on die-casting.

14. (a) Write preparation and uses of poly ethylene.

Or

(b) Write note on natural and synthetic rubber.

15. (a) Write note on conducting polymer.

Or

(b) Write note on silicones.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Explain the classification of polymer based on structure of the polymer.

Or

(b) Explain and write mechanism of chain and free radical polymerization.

17. (a) What are the factors affecting the T<sub>g</sub> value? Explain.

Or

(b) How affect the molecular weight of the polymer on degree of polymerization?

18. (a) Explain the condensation and suspension polymerization.

Or

(b) Explain and sketch the injection moulding and blow moulding method.

19. (a) Write the preparation and properties of phenol-formaldehyde resin and epoxy resin.

Or

(b) Write the uses and preparation of :

(i) Nylon

(ii) Polyester

(iii) Polycarbonate.

20. (a) Explain the polymeric materials in biomedical application.

Or

(b) Explain the polymers in the field of high temperature and fire resistant materials.

(6 pages)

Reg. No. : .....

Code No. : 40290 E      Sub. Code : JSCH 3 A/  
SSCH 3 A

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry — Main

Skill Based Subject — AGROCHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- A high nitrogen providing organic manures is  
(a) urea                                  (b) super phosphate  
(c) blood meal                          (d) oil cakes
- The molecular formula of urea is  
(a)  $\text{Ca}_3(\text{PO}_4)_2$                       (b)  $\text{CaH}_4(\text{PO}_4)_2$   
(c)  $\text{NH}_2\text{CONH}_2$                         (d)  $(\text{NH}_4)_2\text{SO}_4$



3. Which of the following is an Inorganic Pesticide?
- (a) DDT
  - (b) BHC
  - (c) Bordeaux mixture
  - (d) None of the above
4. Pyrethrin is a
- (a) fertilizer
  - (b) insecticide
  - (c) metalloid
  - (d) none of the above
5. \_\_\_\_\_ refers to the mineral or organic material from which the soil is formed.
- (a) relief
  - (b) parent material
  - (c) organism
  - (d) chemical or artificial materials
6. The main composition of soil is
- (a) minerals
  - (b) organic matters
  - (c) water
  - (d) air
7. \_\_\_\_\_ denotes the ability of the soil to undergo deformation without cracking.
- (a) texture
  - (b) plasticity
  - (c) dispersion
  - (d) none of the above

8. Yellow or red colour soil indicates the
- (a) Presence of high organic matter
  - (b) Presence of ferric iron oxides
  - (c) Presence of manganese oxide
  - (d) Presence of  $\text{CaCO}_3$
9. The moisture content in the soil will be determined by drying at \_\_\_\_\_ in oven.
- (a)  $200^\circ\text{C}$
  - (b)  $90^\circ\text{C}$
  - (c)  $105-110^\circ\text{C}$
  - (d)  $250^\circ\text{C}$
10. \_\_\_\_\_ tool is used for soil sampling in hard/dry land.
- (a) tube auger
  - (b) screw type auger
  - (c) spade
  - (d) scale

PART B — ( $5 \times 5 = 25$  marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) How is triple superphosphate manufactured?

Or

- (b) What are micronutrients? Explain their role in plants.

12. (a) Give any two insecticides obtained from plants and explain them.

Or

- (b) What are the DDT and BHC? Explain them briefly.

13. (a) Discuss briefly the origin of soil.

Or

- (b) Write a note on the soil formation.

14. (a) Explain briefly on soil plasticity and soil shrinkage.

Or

- (b) Explain the soil colour and flocculation.

15. (a) How is the pH of soil determined?

Or

- (b) How is the amount of phosphorus present in the soil estimated?



PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What are macronutrients? Explain the role of nitrogen, potassium and phosphorus in plant growth.

Or

- (b) What are manures? Explain any two manures in details.

17. (a) Explain briefly the herbicides, rodenticides and attractants with suitable examples.

Or

- (b) What is meant by first aid? What are the safety measures to be taken during the handling of insecticides?

18. (a) How are rocks and minerals formed? Explain them.

Or

- (b) What are the main components of soil? Explain them in detail.

19. (a) Write a short note on pore space and particle density of soil.

Or

- (b) How are the alkaline, acid and saline nature of soil diagnosed?

20. (a) Explain briefly the how the soil is tested.  
Write down the importance of soil testing.

Or

- (b) How are the moisture content, EC and particle density of the soil sample determined?
-

(8 pages)

Reg. No. : .....

Code No. : 41099 E      Sub. Code : JMCH 22/  
SMCH 22

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry – Main

ORGANIC CHEMISTRY – I

(For those who joined in July 2016 onwards)

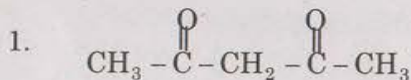
Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

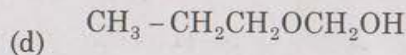
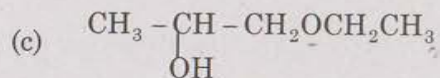
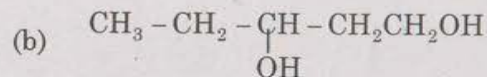
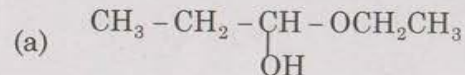
Choose the correct answer :



The IUPAC name of the compound is

- (a) 2,4 – pentanedione
- (b) 1,4 – pentanedione
- (c) 2, 4–dioxypentane
- (d) None of the above

2. The structural formula of 1-ethoxy-1-propanol is



3. Which of the following are weakly deactivating groups in electrophilic substitution reaction?

- (a)  $\text{NH}_2$
- (b)  $\text{OH}$
- (c)  $\text{Cl}$
- (d)  $\text{CF}_3$

4. Choose the correct order of electro negativity

- (a)  $\text{C} < \text{N} < \text{F} < \text{O}$
- (b)  $\text{C} < \text{N} < \text{O} < \text{F}$
- (c)  $\text{C} < \text{F} < \text{O} < \text{N}$
- (d)  $\text{C} < \text{O} < \text{N} < \text{F}$



5. In the presence of peroxide, HBr follows the mechanism

- (a) Ionic mechanism
- (b) Markownikoff's rule
- (c) Free radical mechanism
- (d) None of the above

6.  $(\text{CH}_3)_2\text{C} = \text{CH}_2$   $\xrightarrow[\text{(ii) Oxidation}]{\text{(i) Hydroboration}}$  X. Here 'X' is

- (a)  $(\text{CH}_3)_2\text{CH} - \text{CH}_3$
- (b)  $(\text{CH}_3)_2\text{CH} - \text{CH}_2\text{OH}$
- (c)  $(\text{CH}_3)_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$
- (d)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

7. The boiling point of chloroform is

- (a)  $61^\circ\text{C}$
- (b)  $71^\circ\text{C}$
- (c)  $45^\circ\text{C}$
- (d)  $80^\circ\text{C}$

8. Carbontetra chloride is used as fire extinguisher under the name \_\_\_\_\_

- (a) Styrene
- (b) Pyrne
- (c) Westron
- (d) None of the above

9. Alcohols have high boiling points compared to their corresponding alkanes because of

- (a) Heavy oxygen atom
- (b) Water solubility
- (c) Hydrogen bonding
- (d) None of these

10. Lucas reagent is

- (a)  $\text{HCl}/\text{NaNO}_2$
- (b)  $\text{HCl}/\text{ZnCl}_2$
- (c)  $\text{H}_2/\text{Pd}/\text{H}_2\text{SO}_4$
- (d)  $\text{H}_2/\text{Pd}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

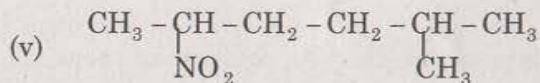
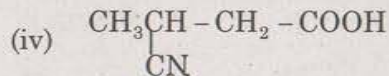
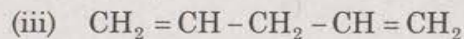
11. (a) What is meant by structural isomerism? Explain with examples.

Or

(b) Name the following organic compounds based on IUPAC nomenclature

(i)  $\text{CH}_3\text{C} \equiv \text{CH}$

(ii)  $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{CH}_2 - \overset{\text{CH}_3}{\text{CH}} - \text{CH}_3$



12. (a) What is meant by hybridisation? Explain  $\text{sp}^3$  hybridisation.

Or

- (b) Explain the stability of olefins with suitable examples.

13. (a) Write down the ozonolysis and hydroboration reactions.

Or

- (b) Explain the peroxide effect with example.

14. (a) How is allyl chloride prepared? Give its four properties and two uses.

Or

- (b) Explain  $\text{E1}$  mechanism with suitable example.

15. (a) How is Oxirane prepared? Give its uses.

Or

- (b) Discuss the importance of Zeisel's method.

PART C — (5 × 8 = 40 marks)

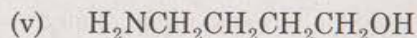
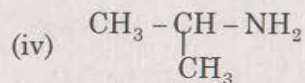
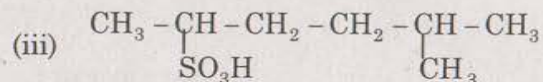
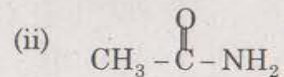
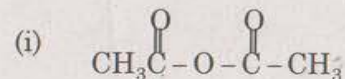
Answer ALL questions, choosing either (a) or (b).

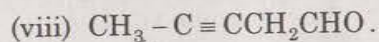
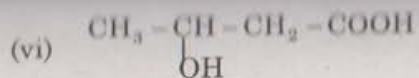
Each answer should not exceed 600 words.

16. (a) How are organic compounds classified based on functional groups? Explain.

Or

- (b) Name the following organic compounds based on IUPAC.





17. (a) (i) Discuss the nucleophiles and electrophiles with suitable examples.  
(ii) Explain the inductive effect with suitable example.

Or

- (b) Discuss the electromeric effect and resonance effect with suitable examples.
18. (a) Describe briefly the mechanism of 1,2 and 1,4- addition reactions.

Or

- (b) (i) Discuss the allylic bromination. (4)  
(ii) State and explain Markownik off's rule. (4)
19. (a) Explain  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2$  mechanisms with suitable examples.

Or

- (b) How is chloroprene prepared? Explain its properties.

20. (a) How is allyl alcohol prepared? Explain its properties.

Or

- (b) How are primary, secondary and tertiary alcohol distinguished? Explain them briefly.



Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the method of least squares. How is best graph drawn by this method?  
Or  
(b) Explain the following terms :  
(i) absolute error  
(ii) relative error  
(iii) percentage error.
17. (a) Discuss in detail the method of estimating the total hardness of water.  
Or  
(b) Describe the mode of treatment of effluent discharged from detergent manufacturing industry.
18. (a) Explain the classification of coal.  
Or  
(b) Explain the ultimate analysis of coal.
19. (a) Write the principle and applications of electrogravimetric analysis.  
Or  
(b) Explain the principle and the applications of polarography.
20. (a) Describe the principle and applications of colorimetry.  
Or  
(b) Write the principle and the instrumentation of DTA.

Code No. : 41119 E      Sub. Code : JMCH 5 C

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fifth Semester

Chemistry — Main

Major Elective — ANALYTICAL CHEMISTRY

(For those who joined in July 2016 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

- Instrumental uncertainties causes \_\_\_\_\_.  
(a) personal error  
(b) determinate error  
(c) indeterminate error  
(d) none of the above.
- The difference between the maximum and the minimum value of a set is called \_\_\_\_\_.  
(a) Deviation                      (b) Error  
(c) Range                              (d) Mean.
- What is the compound acted upon the coliform?  
(a) glucose                              (b) fructose  
(c) lactose                                (d) mannitol.



4. Which is not removed in making drinking water?  
 (a) colour (b) odour  
 (c) germs (d) dissolved salts.
5. \_\_\_\_\_ point of a lubricant is determined by mixing equal volumes of aniline and oils sample in a tube.  
 (a) pour (b) fire  
 (c) aniline (d) flash.
6. Water gas is a mixture of \_\_\_\_\_.  
 (a)  $\text{CO} + \text{H}_2$  (b)  $\text{CO} + \text{N}_2$   
 (c)  $\text{CO}_2 + \text{H}_2$  (d)  $\text{CO}_2 + \text{N}_2$ .
7. \_\_\_\_\_ methods of analysis eliminate the need for burette and balance.  
 (a) colorimetry (b) coulometric  
 (c) gravimetric (d) volumetric.
8. \_\_\_\_\_ is used as a suppressor in the polarography measurement.  
 (a) resin (b) vaseline  
 (c) gelatin (d) none of these.
9. The scattering is \_\_\_\_\_ in nephelometry.  
 (a) inelastic (b) elastic  
 (c) reflected (d) transmitted.
10. The exothermic peak observed in the DTA of  $\text{C}_a\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$  is due to the eliminations of \_\_\_\_\_.  
 (a)  $\text{H}_2\text{O}$  (b)  $\text{CO}_2$   
 (c)  $\text{CO}$  (d)  $\text{O}_2$ .

PART B — ( $5 \times 5 = 25$  marks)  
 Answer ALL questions choosing either (a) or (b).  
 Each answer should not exceed 250 words.

11. (a) Explain precision and accuracy.  
 Or  
 (b) Explain t-test with an example.
12. (a) Explain how is colour and turbidity of water removed.  
 Or  
 (b) Explain COD.
13. (a) Explain flash point.  
 Or  
 (b) Explain Octane number.
14. (a) Discuss the apparatus used in amperometric titration.  
 Or  
 (b) Give the applications of coulometric titrations.
15. (a) Explain thermometric titrations.  
 Or  
 (b) Explain Nephelometry.

(6 pages)

Reg. No. : .....

Code No. : 40300 E Sub. Code : JMCH 5 C/  
SECH 5 C

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fifth Semester

Chemistry – Main

Major Elective – II – ANALYTICAL CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

1. The mean value for 12.20, 12.04, 12.24 and 12.28 is  
(a) 12.23 (b) 12.29  
(c) 12.09 (d) 12.06
2. The number of significant figures in the value 12.205 is  
(a) 6 (b) 5  
(c) 3 (d) 2

3. Hardness of water is expressed in  
(a)  $10^3$  (b) PPM  
(c) TDS (d) NTU
4. Which one of the following is not a water quality standard?  
(a) COD (b) BOD  
(c) TDS (d) NTU
5. Which one of the following is not a gaseous fuel?  
(a) LPG (b) CNG  
(c) Water gas (d) NCV
6. Abel's apparatus is used for the determination of  
(a) Flash point  
(b) Aniline point  
(c) Octane number  
(d) Knocking
7. According to Faraday's Law  
(a)  $W \propto Q$  (b)  $W = ZQ$   
(c)  $W = \frac{MQ}{NF}$  (d) All these



8. DME is used in
- (a) Coulometry            (b) Polarography  
(c) Redox titration       (d) Amperometry

9. The colour of  $[\text{Fe}(\text{SCN})_6]^{-3}$  is
- (a) blue                      (b) red  
(c) pink                      (d) violet

10. The expansion of DTA is
- (a) differential thermal analysis  
(b) direct thermal analysis  
(c) diode thermal analysis  
(d) Differential titration analysis

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Give the difference between accuracy and precision.

Or

- (b) Define mean, median and mode with examples.

12. (a) Give any four chemical characterisation of water.

Or

- (b) Give short note on bacteriological examination of water.

13. (a) Define flash point and octane number.

Or

- (b) What are the qualities of a good fuel?

14. (a) What are the applications of coulometric titrations?

Or

- (b) Discuss the principle of electro gravimetry.

15. (a) Compare nephelometry and turbidimetry.

Or

- (b) What are the advantage of spectro photometer over ordinary colorimeter?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) What are the different type of errors explain in details?

Or

- (b) Write notes on
- (i) Significant figures
  - (ii) Standard deviation

17. (a) What is BOD? How will you determine it?

Or

- (b) Write notes on sampling and preservation of water samples.

18. (a) How will you determine the moisture content and ash content of coal?

Or

- (b) Write notes on water gas and produces gas.

19. (a) What are the important advantages of amperometric titration?

Or

- (b) Discusses the principle and working of polarograph.

20. (a) Write notes on TGA and DTA thermograms of calcium oxalate mono hydrate.

Or

- (b) How can you determine iron and nickel using spectrophotometry?
-

(6 pages)

Reg. No. : .....

Code No. : 40294 E      Sub. Code : JNCH 3 A/  
SNCH 3 A

U.G. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry

Non Major Elective — FOOD CHEMISTRY

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A mineral that the body needs to work properly is
  - (a) Calcium
  - (b) Silver
  - (c) Gold
  - (d) Lead
2. About half of our diet should be made up of
  - (a) grains and vegetables
  - (b) fruits and milk
  - (c) milk and cheese
  - (d) fats and sugars



3. Which of the following is not a function of a food additive?
- (a) To maintain product consistency
  - (b) To maintain nutritive value
  - (c) Controlling acidity /alkalinity
  - (d) None of the above
4. The examples of food additives
- (a) Stabilizers
  - (b) Emulsifiers
  - (c) Antioxidants
  - (d) All the above
5. Spreading pathogens from one surface to another
- (a) autoclaving
  - (b) cross-contamination
  - (c) sulfuring
  - (d) food preservation
6. A type of food preservation technique that involves sealing food in sterilized air light containers is
- (a) freezing
  - (b) drying
  - (c) canning
  - (d) irradiation
7. Pasteurization is the process of heating milk
- (a) above  $121^{\circ}\text{C}$
  - (b) above boiling point
  - (c) below boiling point
  - (d) above  $180^{\circ}\text{C}$

8. The process of preserving food by rapid freezing followed by dehydration under vacuum is called
- (a) Lyophilisation      (b) Sterilization  
(c) Cold dehydration    (d) Cryo preservation
9. Which is responsible for the implementation of FSSAI
- (a) Ministry of Health and Family Welfare  
(b) Ministry of Food Processing Industries  
(c) Department of Agriculture and Cooperation  
(d) Directorate General of Health Services
10. WTO stands for
- (a) World Health Organisation  
(b) World Healing Organisation  
(c) Wealth Health Organisation  
(d) None of the above.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) Write a note the calorific value of food.

Or

- (b) Discuss briefly the balanced diet.

12. (a) Explain briefly the bleaching agents which are used as food additives.

Or

- (b) What are food additives? Explain briefly the food colourants with suitable example.

13. (a) What are food preservation? Explain with suitable examples.

Or

- (b) Discuss the drying method of food preservation with suitable example.

14. (a) What is meant by food adulteration? How is turmeric powder adulterated? How are they detected?

Or

- (b) What are the adulterants present in Chilli powder? How are they detected?

15. (a) Expand AGMARK, FA and WHO. What are their functions?

Or

- (b) Explain briefly the consumer protection Act.



PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Explain briefly the functions and biological importance of proteins and vitamins.

Or

- (b) What are the functions of carbohydrates and fats? Explain briefly their biological importance.

17. (a) Explain any four natural and artificial food additives.

Or

- (b) Discuss the properties of food additives with suitable examples.

18. (a) Describe the heat and radiation methods of food preservation.

Or

- (b) Discuss briefly the cold and deep freezing food preservation.

19. (a) What are the adulterants of coffee powder and milk? How are they detected?

Or

- (b) What are adulterants present in pulses and oil? How are they detected?

20. (a) Describe briefly the packing and labelling of food.

Or

- (b) What is meant by quality control? Explain its importance. Explain the essential commodities Act in details.
-

(6 pages)

Reg. No. : .....

Code No. : 40292 E      Sub. Code : JSCH 4 A/  
SSCH 4 A

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fourth Semester

Chemistry — Main

Skill Based Subject — CHEMISTRY IN MEDICINE

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 10 = 10 marks)

Answer ALL questions.

1. The drug dimercaprol is used as an antidote for \_\_\_\_\_.  
(a) Mercury                      (b) Sulphur  
(c) Alkali                         (d) Salicylate
2. First aid kit contains the following  
(a) cotton                         (b) antiseptic cream  
(c) tincture iodine             (d) all the above



3. The chemical compound which is used to treat anemia is
- (a) Glucose
  - (b) Alum
  - (c) Ferrous Gluconate
  - (d) Aluminium chloride
4. Deficiency of Iodine causes
- (a) Rickets
  - (b) Swelling of thyroid gland
  - (c) Anemia
  - (d) None of the above
5. Triple vaccine is used to treat
- (a) Diptheria
  - (b) Whooping cough
  - (c) Tetanus
  - (d) For all the above
6. The disease caused by Culex mosquito is
- (a) Dengue fever
  - (b) Malaria fever
  - (c) Elephantiasis
  - (d) Tuberculosis

7. The metal present in haem is
- (a) Magnesium                      (b) Cobalt
- (c) Iron                                (d) Manganese
8. Sackett's method is used for the estimation of
- (a) Glucose level in blood
- (b) Cholesterol level in blood
- (c) Potassium level in blood
- (d) None of the above
9. Night blindness is caused due to the deficiency of the vitamin
- (a) 'D'                                (b) 'E'
- (c) 'K'                                (d) 'A'
10. Which one is the sulphur containing vitamin?
- (a) Vitamin B<sub>2</sub>                      (b) Vitamin B<sub>1</sub>
- (c) Vitamin B<sub>6</sub>                      (d) Vitamin B<sub>12</sub>

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the first aid treatment for accidental fractures.

Or

- (b) Write short notes on the antidotes for mercury poisoning.

12. (a) Explain the biological importance of calcium.

Or

- (b) Write notes on :

- (i) Aluminium Hydroxide gel
- (ii) Ferric ammonium citrate.

13. (a) Discuss the reasons for the formation of peptic ulcer and the methods of prevent it.

Or

- (b) What is meant by amoebic dysentery? How can it be prevented?

14. (a) Explain blood grouping in detail.

Or

- (b) Explain the Glucose tolerance test in detail.



15. (a) Discuss the sources and diseases caused by the deficiency of Vitamin 'E'.

Or

- (b) Discuss the classification of Vitamins.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the important rules of first aid.

Or

- (b) Write short notes on :

- (i) Different poisonous bites
- (ii) Acid poisoning.

17. (a) Explain the biological role of potassium in detail.

Or

- (b) Explain the biological role of copper in detail.

18. (a) Write notes on the following :

- (i) Asthma
- (ii) Epilepsy.

Or

- (b) Explain the prevention and treatment of air-borne diseases.

19. (a) Explain the determination of serum cholesterol by Sackett's method?

Or

(b) Discuss in detail about white blood corpuscles.

20. (a) Write notes on :

(i) Vitamin B<sub>6</sub>

(ii) Vitamin B<sub>12</sub>

(iii) Vitamin B<sub>6</sub>.

Or

(b) Discuss in detail about ascorbic acid.

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3. The percentage of nitrogen in urea is
- (a) 56.6 (b) 36.6  
(c) 26.6 (d) 46.6
4. Which is a bio-fertilizer?
- (a) Blue-green algae (b) Urea  
(c) KCl (d) None of these
5. Natural Rubber is the polymer of \_\_\_\_\_.
- (a) neoprene (b) ethylene  
(c) acetylene (d) isoprene
6. Which is a thermoset plastic?
- (a) PVC (b) Nylon  
(c) Polystyrene (d) Babelite
7. The first antibiotic invented is
- (a) Tetracyclin (b) Penicillin  
(c) Aspirin (d) None of these
8. Disease cured by ferrous fumarate
- (a) anaemia (b) cholera  
(c) diabetes (d) none of these

9. The raw material used to prepare chalk pieces
- (a) Acetone                      (b) Carbohic acid  
(c) Plaster of Paris          (d) Zinc oxide
10. The antiseptic in talcum powder
- (a) zinc oxide  
(b) alum  
(c) chalk piece powder  
(d) magnesium stearate

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) How are the toilet soaps manufactured?

Or

- (b) Explain the types of detergents.

12. (a) List the types of fertilizers.

Or

- (b) Explain bio-fertilizers.

13. (a) Why natural rubber is vulcanized? How?

Or

(b) Tabulate the differences between thermoplastics and thermoset plastics.

14. (a) Give the uses of the following medicines :

(i) Boric acid

(ii) Diazepam.

Or

(b) Write short notes on :

(i) Antacids

(ii) Mouth washes.

15. (a) Explain the preparation of phenyl.

Or

(b) Explain the preparation of agarbattis.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Explain the types of soaps.

Or

(b) Detergents are better than soaps. Explain.



17. (a) Describe the role of nitrogen, phosphorous and potassium in plants growth.

Or

- (b) Write short notes on :

(i) Urea

(ii) KCl.

18. (a) Give the uses of the following compounds :

(i) PVC

(ii) Thermocole

(iii) Teflon

(iv) Polythene.

Or

- (b) (i) Give the advantages of plastics.

(ii) Give the uses of nylon.

19. (a) (i) Explain the uses of analgesics with example.

(ii) Write notes on Haematinics.

Or

(b) Give the uses of the following :

(i) Alum

(ii) Paracetamol

(iii) Penicillin

(iv) Tetracyclines.

20. (a) Explain about writing inks.

Or

(b) Give the preparation and uses of Toothpaste.

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Code No. : 7158

Sub. Code : PCHM 22

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry — Core

INORGANIC CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Which of the following metal fluorides has highest lattice energy?
  - CrF<sub>2</sub>
  - ZnF<sub>2</sub>
  - NiF<sub>2</sub>
  - CoF<sub>2</sub>
- Evidence for covalency in M–L bond in a complex is provided by \_\_\_\_\_.
  - CFSE
  - Nephelauxetic effect
  - Lattice energy
  - Hydration energy

- Inertness of a complex depends on
  - reaction energy
  - activation energy
  - both (a) and (b)
  - none of the above
- From the relative trans directing capabilities of Cl and NH<sub>3</sub> predict the products of the reaction,
 
$$[\text{PtCl}_4]^{2-} + \text{NH}_3 \rightarrow \underline{\text{A}} + \text{NH}_3 \rightarrow \underline{\text{B}}$$
  - $[\text{PtCl}_3(\text{NH}_3)]^-$  and cis- $[\text{PtCl}_2(\text{NH}_3)_2]$
  - $[\text{PtCl}_3(\text{NH}_3)]^-$  and trans- $[\text{PtCl}_2(\text{NH}_3)_2]$
  - $[\text{PtCl}_3(\text{NH}_3)]^-$  and cis- $[\text{PtCl}_4]^{2-}$
  - None of the above
- The octahedral hydrated Co(II) complex  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  appears pink red in acid solution while tetrahedral Co(II) complex of  $[\text{CoCl}_4]^{2-}$  appears blue. Why?
  - Electronic transition is Laporte forbidden in  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ , but it is allowed in  $[\text{CoCl}_4]^{2-}$
  - In  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ , electronic transition is spin allowed but in  $[\text{CoCl}_4]^{2-}$  it is forbidden.
  - $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  has no center of symmetry but  $[\text{CoCl}_4]^{2-}$  has center of symmetry.
  - $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  exhibits CT spectrum but  $[\text{CoCl}_4]^{2-}$  has no CT spectrum



6. How many peaks are expected in the electronic spectrum of  $\text{trans-}[\text{Cr}(\text{en})_2\text{F}_2]^+$  ( $D_4$  th symmetry)?
- (a) 3 (b) 4  
(c) 5 (d) 6
7. Which of the following metal ions is not expected to have orbital contribution to the magnetic moment in octahedral geometry?
- (a)  $\text{Ti}^{3+}$  (b)  $\text{Cr}^{3+}$   
(c)  $\text{V}^{3+}$  (d)  $\text{Fe}^{3+}$  (high spin)
8. Calculate the magnetic moment for  $[\text{Cr}(\text{H}_2\text{O})_6]\text{SO}_4$  complex in B.M.
- (a) 2.83 (b) 4.90  
(c) 3.88 (d) 5.92
9.  $3\text{RNH}_3\text{Cl} + 3\text{BCl}_3 \rightarrow \underline{\text{X}} + \text{NaBH}_4 \rightarrow \underline{\text{Y}}$ . What are  $\underline{\text{X}}$  and  $\underline{\text{Y}}$ ?
- (a)  $\text{Cl}_3\text{B}_3\text{N}_3\text{R}_3$  and  $\text{H}_3\text{B}_3\text{N}_3\text{R}_3$   
(b)  $\text{B}_3\text{N}_3\text{H}_6$  and  $\text{B}_3\text{N}_3\text{H}_{12}$   
(c)  $\text{B}_3\text{N}_3\text{H}_6\text{Cl}_6$  and  $\text{H}_3\text{B}_3\text{N}_3\text{R}_3$   
(d)  $\text{H}_3\text{B}_3\text{R}_3$  and  $\text{Cl}_3\text{B}_3\text{N}_3\text{H}_9$
10. Which among the following is not a Zintl ion?
- (a)  $\text{Sn}_9^{4-}$  (b)  $\text{Pb}_7^{4-}$   
(c)  $\text{V}_5\text{O}_{14}^{3-}$  (d)  $\text{Te}_6^{4+}$

PART B — ( $5 \times 5 = 25$  marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Illustrate the importance of CFSE in site selection in spinels and inverse spinels.

Or

- (b) (i) With the help of MOT explain why  $\text{CN}^-$  occupies a high position in the spectrochemical series than  $\text{Cl}^-$ .
- (ii) The first row transition metal ions form both low spin and high spin octahedral complexes, whereas III row transition metal ions form only low spin octahedral complexes. Explain.

12. (a) Discuss the mechanism of outer sphere electron transfer reactions with examples.

Or

- (b) The successive stability constants for the species formed in aqueous solution, when 'en' reacts with  $\text{Ni}^{2+}$ , are as follows:  $\log K_1 = 7.5$ ,  $\log K_2 = 6.2$ , and  $\log K_3 = 4.4$ . Calculate  $\beta_3$ . What species are present in equilibrium, described by  $K_3$ ? Give the geometry of the nickel containing species involved in the equilibrium described by  $K_3$ .



13. (a) Account for ten extremely weak absorption bands in the electronic spectrum of  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ .

Or

- (b) How is IR spectroscopy useful in identifying geometrical and linkage isomers?
14. (a) Explain the quenching of orbital magnetic moment in inorganic complexes with suitable examples.

Or

- (b) Describe the following with examples:
- (i) Temperature independent paramagnetism
- (ii) Antiferromagnetism.
15. (a) Show how the  $\text{SiO}_4^{2-}$  tetrahedral can be linked to give
- (i) cyclic silicates
- (ii) amphiboles
- (iii) sheet silicates
- (iv) pyroxenes.

Or

- (b) Discuss the structure and bonding of dinuclear clusters with an example of  $\text{MO}_2\text{Cl}_8^{2-}$ .

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Using LGO, set up M.O. diagram for bonding in the complex  $[\text{Co}(\text{NH}_3)_6]^{3+}$ . Indicate the electronic configuration and magnetic property.

Or

- (b) State Jahn-Teller theorem. Give the  $d^n$  configurations in which Jahn-Teller effect is operative. How is static and dynamic Jahn-Teller distortions in a compound is determined?

17. (a) (i) Give evidences in support of  $S_N^1\text{CB}$  mechanism operative in base hydrolysis. List out two instances where this mechanism fails.
- (ii) Describe spectrophotometric method for determining the stability constant of complexes.

Or

- (b) Discuss the mechanism, rate law, effect of incoming group, effect of leaving group and steric effect in the substitution reaction of square planar complexes.



18. (a) With a help of Orgel diagram discuss the electronic spectrum of octahedral Ni(II) complexes. The electronic spectrum of an octahedral Ni(II) complex has the following spectral bands:  $10800\text{ cm}^{-1}$ ,  $16800\text{ cm}^{-1}$  and  $26300\text{ cm}^{-1}$ . Assign these transitions. Evaluate  $10Dq$ ,  $B'$  and nephelauxetic ratio. (For free metal ion  $B = 1056\text{ cm}^{-1}$ ).

Or

- (b) (i) Explain the following observations with the help of Tanabe Sugano diagram:  $[\text{CoF}_6]^{3-}$  is blue in colour and the electronic spectrum shows a band at  $13000\text{ cm}^{-1}$ ;  $[\text{Co}(\text{en})_3]^{3+}$  is yellow in colour and has two absorption peaks at  $21400\text{ cm}^{-1}$  and  $29500\text{ cm}^{-1}$ .
- (ii) What are charge transfer transitions? With suitable examples explain different types of charge transfer spectra? How do they differ from d-d transitions?

19. (a) (i) Calculate the spin only magnetic moment for  $\text{Co}(\text{H}_2\text{O})_6^{2+}$  and  $\text{CoCl}_4^{2-}$ . The experimental magnetic moment for  $\text{Co}(\text{H}_2\text{O})_6^{2+}$  is 5.0 BM and for  $\text{CoCl}_4^{2-}$  is 4.4 B.M. Explain.

- (ii) Illustrate with examples the effect of spin-orbit coupling on magnetic moment.

Or

(b) (i) Describe briefly how magnetic susceptibility measurements are helpful in the structural determination of metal complexes.

- (ii) Using magnetic property how can square planar Ni(II) complex be differentiated from tetrahedral one.

20. (a) Explain the structural features of isopolyvanadate and isopolymolybdate.

Or

(b) (i) How is phosphonitrilic chloride prepared? Explain the structure and Craig and Paddock and Dewar theories of bonding in it.

- (ii) Discuss Wade's rule to determine the structure of carboranes. Based on above rules deduce the structure of  $\text{C}_2\text{B}_{10}\text{H}_{12}$ .



(8 pages)

Reg. No. : .....

Code No. : 7875

Sub. Code : PCHE 11

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

First Semester

Chemistry

Elective : ADVANCED TOPICS IN CHEMISTRY – I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

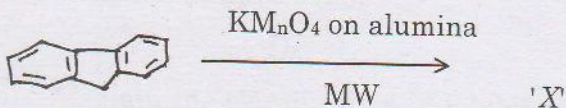
PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In the case of microwave ovens, the commonly used wave frequency is roughly \_\_\_\_\_ MHz
  - (a) 2450
  - (b) 1450
  - (c) 3450
  - (d) 4450

2. Identify 'X' in the reaction.



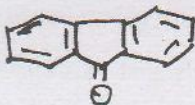
(a)



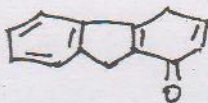
(b)



(c)



(d)



3. Gold spheres of 10-20 nm exhibit \_\_\_\_\_ colour.

(a) Yellow

(b) Purple

(c) Green

(d) Red

4. \_\_\_\_\_ processing pores with at least one dimension in the nanoscale.
- (a) Mesoporous
  - (b) Nanoporous
  - (c) Nano-object
  - (d) Desoporous
5. Metals in the uncombined condition have a \_\_\_\_\_ energy and are in an \_\_\_\_\_ state
- (a) Higher, stable
  - (b) Higher, unstable
  - (c) Lower, stable
  - (d) Lower, unstable
6. The following factors play vital role in corrosion process.
- (a) Solute concentration
  - (b) Temperature
  - (c) Both solute concentration and temperature
  - (d) Solvent concentration



7. HPLC methods include
- (a) Liquid/Solid chromatography
  - (b) Ion exchange and size exclusion chromatography
  - (c) Liquid/liquid chromatography
  - (d) All of the above
8. Absorbed wavelengths in atomic absorption spectrum appears
- (a) Dark lines
  - (b) Light lines
  - (c) Light background
  - (d) dark background
9. Which of the following is not an example of a fuel cell?
- (a) Hexanone-oxygen cell
  - (b) Propane-oxygen cell
  - (c) Methyl-oxygen-alcohol cell
  - (d) Hydrogen-oxygen cell

10. Which of the following reactors uses its fuel as coolant?
- (a) Solid fuel reactor
  - (b) Direct reactor
  - (c) Indirect reactor
  - (d) Both direct and indirect reactors

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Narrate the need of green chemistry.

Or

- (b) Write a brief account on green reactions.

12. (a) Explain the optical properties of nanomaterials.

Or

- (b) Discuss any two chemical approaches for the synthesis of nanoparticles.

13. (a) Write briefly on mechanism of inhibitor action in acidic medium.

Or

(b) Explain the classification of inhibitors based on electrode process.

14. (a) Describe the advantages of atomic absorption spectrometry over flame photometry.

Or

(b) Explain the principle involved in cyclic voltammetry.

15. (a) What are the requirements of the battery to be used in automobiles and UPS?

Or

(b) Write a note on hydrogen economy.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Enumerate and explain the twelve principles of green chemistry.

Or

(b) Discuss the role of microwave technique and advantages in organic synthesis with at least two different examples.



17. (a) Explain any three physical methods for the synthesis of nanoparticles.

Or

- (b) (i) narrate the electronic properties of nanomaterials.
- (ii) Give an account of nano structural materials (5+3)

18. (a) Write briefly on: principles and cost of corrosion. (3 + 5)

Or

- (b) (i) Discuss the electrochemical principles of corrosion.
- (ii) Describe any two corrosion monitoring methods. (4+4)

19. (a) What is coulometry? With suitable circuit diagrams explain the different types of coulometric analysis.

Or

- (b) Explain in detail the theoretical and practical aspects of colorimetry analysis.

20. (a) (i) Give an account of solar energy  
(ii) Write a brief note on fuel cells. (4+4)

Or

- (b) Give a detailed account on nuclear fuels for various types of nuclear reactors.
-

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Fourth Semester

Chemistry – Core

ORGANIC CHEMISTRY – IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

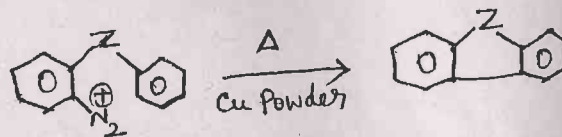
PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer :

1. Phenyl sulphones on reaction with aldehyde, alkenes are formed. This reaction is known as \_\_\_\_\_ reaction

- (a) Shapiro                      (b) Peterson olifination  
(c) Julia olifination        (d) Oxymercuration

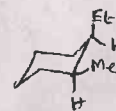
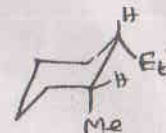
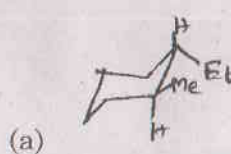


2.

The above reaction is an example of \_\_\_\_\_ reaction

- (a) Pschorr  
(b) Shapiro  
(c) Gomberg-Bechmann  
(d) Halo lactonisation

3. The most preferred conformer of C is 1-ethyl-2-methyl cyclohexane is \_\_\_\_\_



4. The conformational energy associated with Trans-1,4 dimethyl-cyclohexane is \_\_\_\_\_ kcal/mole

- (a) 0.9                              (b) 1.8  
(c) 2.7                              (d) 3.6



5. Robinson annulation reaction is a combination of Michael addition and \_\_\_\_\_ condensation

- (a) Aldol (b) Claisen  
(c) Stobbe (d) Dieckmann

6. The protective group for amine is synthesis is \_\_\_\_\_

- (a) Ether (b) Acetal  
(c) Ketal (d) Acetyl

7. Which among the following is not a oestrogen?

- (a) Progesterone (b) Testosterone  
(c) Oestriol (d) Oestrone

8. Which among the following is not the irradiated product of ergosterol?

- (a) Calciferol (b) Lumisterol  
(c) Stigmasterol (d) Tachysterol

9. When 1,2-dimethyl cyclohexene is subjected to reduction in presence of Adams catalyst, we get \_\_\_\_\_ 1,2-dimethyl cyclohexane

- (a) 80% cis and 20% trans  
(b) 20% cis and 80% trans  
(c) 100% cis  
(d) 100% trans

10. Arylation of olefin takes place by treatment of an alkene with aryl palladium reagent is known as \_\_\_\_\_ reaction

- (a) Suzuki (b) Heck  
(c) Negishi (d) Still

PART B — (5 × 5 = 25 marks)

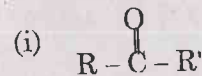
Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is Shapiro reaction? Give its mechanism.

Or

(b) What happens when the following compounds are oxidised with peracids?



(ii) benzophenone

(iii) cyclopentanone what is the name of this reaction? Give mechanism for the first reaction only.

12. (a) Trans decalin is rigid while Cis-decalin is flexible in nature. Give reason. How will you prove their existence using  $^1\text{H}$  NMR spectroscopy?

Or

(b) Trans 1,2-dimethyl cyclohexane is more stable than Trans 1,3-dimethyl cyclohexane. Give explanation.

13. (a) What is the need of doing FGI? Explain FGI with an example.

Or

- (b) What do you mean by Relay approach to synthesis? By this method, how will you synthesis Comphor?

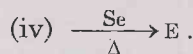
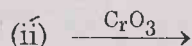
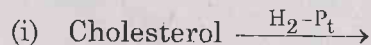
14. (a) What is DMSO? Give four of its application.

Or

- (b) (i) What is 9 BBN? Write any two of its application.

- (ii) What is Dess-Martin reagent? What is its special use?

15. (a) Complete the following reaction. Write the structural formula for the letters A to E.



Or

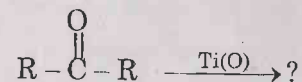
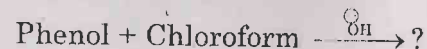
- (b) Give an account on structures and functions of prostaglandins  $E_1$ ,  $E_2$  and  $A_2$ .

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Complete and give mechanism for the following reactions



Or

- (b) Explain Stobbe condensation and witting reaction with mechanism.

17. (a) What do you mean by Torsional energy? Write down the possible conformers of Perhydrophenanthrene and discuss their stability.

Or

- (b) Account for the following

- (i) d (or) l-2, 3-dihydroxybutane reacts with acetone as faster than its meso form.

- (ii) Cis-4-hydroxyl carboxylic acid readily undergo lactonisation on heating while its trans isomer does not.

Code No. : 7165

Sub. Code : PCHM 41

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry — Core

## ORGANIC CHEMISTRY — IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. When  $\alpha$ -silyl Carbanions react with Carbonyl compound,  $\beta$ -silyl alcohol derivative is formed. This on treatment with a base gives alkene. This reaction is called \_\_\_\_\_ reaction.
- (a) Stobbe condensation  
 (b) Julia olifination  
 (c) Peterson olefination  
 (d) Oxymercuration

2. The intermediate formed in Gomberg-bechmann reaction is \_\_\_\_\_ radical.
- (a) Aryl (b) Alkyl  
 (c) Acyl (d) Acyloxy
3. The number of Chiral Carbon present in Perhydropheanthrene is \_\_\_\_\_
- (a) 1 (b) 2  
 (c) 3 (d) 4
4. The chair form of  $\alpha$  cyclohexanone possess \_\_\_\_\_ strain.
- (a) angle  
 (b) torsional  
 (c) bond length distortion  
 (d) both (a) and (b)
5. The protective group for acid is \_\_\_\_\_.
- (a) Ester (b) Acetal  
 (c) Ether (d) Ketal
6. The appropriate synthetic equivalent for  $\overset{\ominus}{\text{C}}\text{H}_2$  is \_\_\_\_\_.
- (a)  $\text{CH}_3\text{OAC}$  (b)  $\text{CH}_3\text{Li}$   
 (c)  $\text{CH}_2\text{Cl}$  (d)  $\text{CH}_3\text{OT}_s$



PART B— (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write notes on Mc Murray coupling reaction.

Or

- (b) What are Gomberg-Bechmann and Pechor reactions? Give an example for each.

12. (a) Cis-1,3-dimethyl cyclohexane is more stable than Cis-1,2-dimethyl cyclohexane. Give explanation.

Or

- (b) (i) Axial-2-bromo cyclohexanone is more stable than its equatorial isomer. Give reason.

- (ii) Why is Cis-4-*t*-butyl cyclohexane Carboxylic acid undergo esterification at a slower rate than its Trans isomer?

13. (a) Robinson annulation sequence reaction is more useful for organic chemists. Explain it with two examples.

Or

- (b) Discuss the retero synthesis and total synthesis of 2,4-dimethyl-2-hydroxy pentanoic acid.

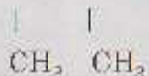
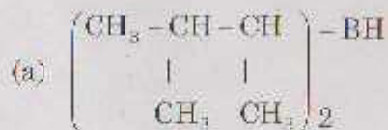
7. Which among the following is a androgens?

- (a) Oestrone (b) Oastriol  
(c) androsterone (d) progesterone

8. Which among the following is a bile acid?

- (a) Etianic acid  
(b) lithocholic acid  
(c) 5 $\alpha$ -cholanic acid  
(d) 5 $\beta$ -cholanic acid

9. Disiamyl borane is \_\_\_\_\_.



10. Which among the following is a superhydride?

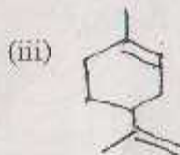
- (a)  $(\text{CH}_3)_2\text{CuLi}$  (b)  $\text{LiAlH}_4$   
(c)  $\text{NaBH}_4$  (d)  $\text{Li}(\text{C}_2\text{H}_5)_3\text{BH}$

14. (a) (i) Explain Suzuki Coupling reaction with an example.
- (ii) What is Dess-Martin reagent? Write its special use.

Or

- (b) What is Adams Catalyst? What happens when the following compounds are subjected to reduction in presence of this catalyst

- (i) benzene
- (ii) 1, 2 - dimethyl cyclohexene



15. (a) Discuss the conformational structure of  $5\alpha$ -cholestane and  $5\beta$ -cholestane.

Or

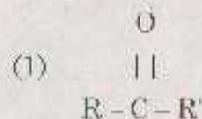
- (b) How will you convert
- (i) Oestrone into oestriol and
- (ii) Oestriol into Oestrone?

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Write notes on Petersons olefination reaction.

- (ii) What happens when the following compounds are oxidised with peracids?



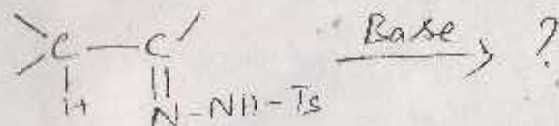
(2) acetophenone

(3) Cyclopentanone.

What is the name of this reaction? Give the mechanism for the first reaction only.

Or

- (b) (i) Explain Darzen condensation reaction with its mechanism.
- (ii) Complete and give mechanism for the following reaction.



17. (a) (i) Why is trans-decalin more stable than 9-methyl trans decalin?
- (ii) Write down the preferred conformer of trans - 1, 3-di-*t*-butyl-cyclohexane. Give explanation.

Or

- (b) What do you mean by conformational energy? Discuss the stability of various conformers of perhydrophenanthrene.

18. (a) (i) Define protecting group. With an example, explain the protection of alcohol and its deprotection in Organic synthesis.
- (ii) Discuss the disconnection approach and total synthesis of Cis-Jasmone.

Or

- (b) (i) Explain the terms retero synthesis, synthons and synthetic equivalent.
- (ii) What is the appropriate key intermediate as considered in the disconnection approach of Twistone? By Robinson annulation reaction how will you synthesise the intermediate? Write down the total synthesis of Twistane, the target molecule.

19. (a) (i) What is DDQ? Give three of its application.
- (ii) Write down the importance of trialkyl silyl halide.

Or

- (b) (i) Explain Heck reaction with an example.
- (ii) What is the action of  $O_3O_4 - H_2O_2$  with the following compounds.
- (1) Propenal
  - (2) Allyl alcohol
  - (3) 2-methyl-1-propene
  - (4) Cyclohexene
  - (5) Trans-2-butene.

20. (a) Discuss the positions of double bond and hydroxyl group in cholesterol.

Or

- (b) How will you synthesise
- (i) Progesterone
  - (ii) 5 $\alpha$ -cholanic acid and
  - (iii) Testosterone from cholesterol.



(8 pages)

Reg. No. : .....

Code No. : 7153

Sub. Code : PCHM 11

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

First Semester

Chemistry - Core

ORGANIC CHEMISTRY - I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

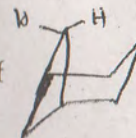
PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Cyclopentadienyl anion is an example of \_\_\_\_\_ compound and is \_\_\_\_\_.

- (a) benzenoid, aromatic
- (b) non-benzenoid, aromatic
- (c) non-benzenoid, antiaromatic
- (d) benzenoid, non-aromatic



2. The nomenclature of \_\_\_\_\_ is \_\_\_\_\_.

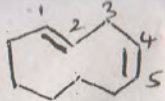
- (a) bicyclo [2.2.2] octane
- (b) bicyclo [2.2.1] heptane
- (c) bicyclo [3.1.1] heptane
- (d) bicyclo [3.2.1] octane

3. The number of transition state formed in electrophile substitution of benzene is \_\_\_\_\_.

- (a) 0
- (b) 1
- (c) 2
- (d) 3

4. In aliphatic nucleophilic substitution unimolecular reaction, the geometry of first transition resembles to that of \_\_\_\_\_.

- (a) Reactant
- (b) Product
- (c) Second transition state
- (d) Intermediate

5. The nomenclature of  is of \_\_\_\_\_ configuration.

- (a) 1E, 4Z (b) 1Z, 4Z  
(c) 1E, 4E (d) 1Z, 4E

6. The methylene protons in 1-bromo-3-chloro propane is said to be \_\_\_\_\_.

- (a) homotopic protons  
(b) enantiotopic protons  
(c) diastereotopic protons  
(d) none of these

7. Which among the following is the increasing order of migratory aptitude among the alkyl group is \_\_\_\_\_.

- (a)  $\text{Me-} > \text{Et-} > \text{Me}_2\text{CH-} > \text{Me}_3\text{C-}$   
(b)  $\text{Me-} < \text{Et-} < \text{Me}_2\text{CH-} < \text{Me}_3\text{C-}$   
(c)  $\text{Me}_3\text{C-} < \text{Me}_2\text{CH-} < \text{Et} < \text{Me}$   
(d)  $\text{Me}_3\text{C-} > \text{Me}_2\text{CH-} > \text{Et} > \text{Me}$

8. In \_\_\_\_\_ rearrangement, the carbon to carbon migration does not occur.

- (a) Demjanov (b) Arndt-Eistert  
(c) Wagner-Meerwein (d) Curtius

9. Pent-2-ene on reaction with Lemieux-Johnson reagent gives \_\_\_\_\_ and \_\_\_\_\_.

- (a) acetaldehyde and propanaldehyde  
(b) acetic acid and propanoic acid  
(c) acetic acid and formic acid  
(d) acetaldehyde and acetone

10. Cyclohexene on reaction with Lemieux-Von Rudloff reagent gives \_\_\_\_\_.

- (a) maleic acid (b) fumaric acid  
(c) adipic acid (d) succinic acid

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write notes on Alternant and Non-Alternant hydrocarbons.

Or

(b) Write down the synthesis of adamantane.

12. (a) Explain the various terms in Hammett equation.

Or

(b) With energy profile diagram, explain kinetic control product and thermodynamic control product formation each with an example.

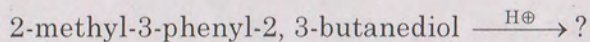


13. (a) Illustrate Prelog's rule with an example.

Or

(b) Discuss the stereochemistry of ansa compounds.

14. (a) Complete and write down the mechanism for the major product in the following reaction.



Or

(b) Write down the various steps in Fischer-Indole synthesis of Indole (or) its derivative.

15. (a) What is umpolung? Give any four applications of 1, 3-dithiane.

Or

(b) What is the action of Gilman's reagent ( $R_2CuLi$ ) with the following compounds

- (i) 1-bromo-1-cyclohexene
- (ii) Trans-1-bromo-1-butene
- (iii) acid chloride
- (iv) n-octyl iodide
- (v) allyl chloride.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)  
Each answer should not exceed 600 words.

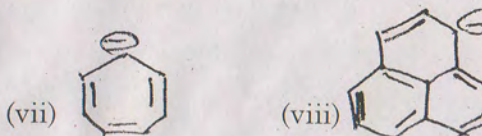
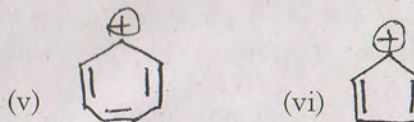
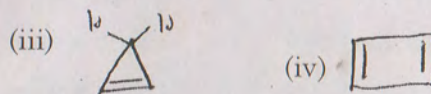
16. (a) (i) Write notes on azulene and sydnones.

(3 + 3)

(ii) Explain Huckel's rule with an example. (2)

Or

(b) Identify the following compounds as aromatic, anti-aromatic and non-aromatic. Give explanation.





M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Second Semester

Chemistry — Core

PHYSICAL CHEMISTRY — II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The correct Schrodinger's wave equation for an electron with total energy E and potential energy V is

- (a)  $\partial^2 \psi / \partial x^2 + \partial^2 \psi / \partial y^2 + \partial^2 \psi / \partial z^2 + E = V - \{8\pi^2 m / h^2\} \psi$
- (b)  $\partial^2 \psi / \partial x^2 + \partial^2 \psi / \partial y^2 + \partial^2 \psi / \partial z^2 + \{8\pi^2 m / h^2\} (E - V) \psi = 0$
- (c)  $\partial^2 \psi / \partial x^2 + \partial^2 \psi / \partial y^2 + \partial^2 \psi / \partial z^2 + \{8\pi^2 / n^2 h^2\} (E - V) \psi = 0$
- (d)  $\partial^2 \psi / \partial x^2 + \partial^2 \psi / \partial y^2 + \partial^2 \psi / \partial z^2 + \{8\pi^2 m / h^2\} = (E - V) \psi$

2. A normalized wave function ( $\psi$ ) can be represented as

- (a)  $\int_0^{-\infty} \psi^2 d\tau = 0$       (b)  $\int_{-1}^{+1} \psi^2 d\tau = 0$
- (c)  $\int_{-\infty}^{+\infty} \psi^2 d\tau = 1$       (d)  $\int_{-1}^{+1} \psi^2 d\tau = 1$

3. The quantum numbers for the outer electrons of an atom is  $n=2, l=0, m=0$  and  $s=+1/2$ . The atom is

- (a) H      (b) He  
(c) Li      (d) Be

4. According to variation principle, the approximate energy corresponding to the approximate wave function  $\psi$  \_\_\_\_\_ the true energy

- (a) is lesser than  
(b) is greater than  
(c) is equal to  
(d) has no correlation with

5. The tendency of the ionic atmosphere associated with molecules of water of hydration to move in a direction opposite to that of the central ion is known as

- (a) Asymmetric effect  
(b) Electrophoretic effect  
(c) Viscous effect  
(d) Wein effect



6. Which one of the following electrical double layer models predicts the potential drop between two double layers of charge as linear?
- Helmholtz-Perrin model
  - Gouy-Chapmann model
  - Stern model
  - None of these
7. Which type of chemical reaction is observed at cathode, in electrochemical corrosion
- Oxidation reaction
  - Peritectic reaction
  - Reduction reaction
  - None of the above
8. Select the incorrect statement from the following options
- Fuel cells have high efficiency
  - The emission levels of fuel cells are far below the permissible limits
  - Fuel cells are modular
  - The noise levels of fuel cells are high
9. Which of the following excited state has a long life?
- |           |           |
|-----------|-----------|
| (a) $S_1$ | (b) $S_2$ |
| (c) $T_1$ | (d) $T_2$ |

10. Water dissociates under 'a' radiation into
- A hydrogen radical and a hydroxide radical
  - A hydrogen ion and a hydroxide ion
  - High energy water molecules
  - Steam

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Calculate the probability that a particle in a one-dimensional box of length 'a' is found to be between 0 and a/2.
- Or
- (b) Normalize the wave function  $\psi_{(x)} = \sin\{n\pi/a\}(x)$  for a particle in one-dimensional box of length 'a'.
12. (a) Explain the principle of Hartree-Fock self consistent field method. Apply the method to helium atom.
- Or
- (b) What is the perturbation factor in the Hamiltonian of helium atom? How does first order correction improve the energy for the atom in the ground state?



13. (a) Write the expressions for mean activity coefficient and ionic strength. Calculate the mean activity coefficient in 0.001 M  $\text{Na}_2\text{SO}_4$  solution in water at  $25^\circ\text{C}$ .

Or

- (b) Bring out the relation between activity of an electrolyte in terms of activities of ions. How are the activity coefficients of a strong electrolyte determined?

14. (a) Obtain an expression between current density and over potential. How is it helpful to determine the value of transfer coefficient?

Or

- (b) What are fuel cells? Explain the working of a fuel cell.

15. (a) (i) Define G-value and comment on its importance in radiation chemistry.  
(ii) With a suitable example explain how the excited state  $pK_a$  of a molecule differs significantly from the ground state value.

Or

- (b) Derive Stern-Volmer equation and show how it relates the quantum yield of phosphorescence and its life time.

PART C — ( $5 \times 8 = 40$  marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) What do you mean by the term 'rigid rotor'? Derive the normalized wave function for a rigid rotator, Show that the rotational energy levels are not equispaced.

- (ii) What are spherical harmonics? How are they obtained for the 'd' orbitals?

Or

- (b) Write the Schrodinger wave equation for hydrogen atom. Separate Schrodinger wave equation by using the separation of variables procedure into radial and angular equations. Obtain the normalized wave functions and allowed energy levels for the hydrogen atom.

17. (a) (i) Apply the variation method for the solution of Helium atom problem.  
(ii) What are secular equation and secular determinants?

Or

- (b) (i) Give the quantum mechanical statement of Pauli's exclusion principle. Explain with an example.  
(ii) Using LCAO-MO method obtain the expressions for the normalized wave functions for bonding Molecular orbitals and antibonding Molecular orbitals for the energy states of hydrogen molecular ion.



18. (a) (i) Discuss the causes for the failure of Debye-Huckel-Onsager equation at high concentrations.
- (ii) Calculate the thickness of the ionic atmosphere in 0.1 N solutions of a uni-univalent electrolyte in water at 25°C ( $D = 78.6$ ).

Or

- (b) (i) Write the expressions for the mean ionic molality ( $m_{\pm}$ ) and activity ( $a_{\pm}$ ) of NaCl, CaCl<sub>2</sub>, CuSO<sub>4</sub> and AlCl<sub>3</sub> in terms of their molalities and ionic activity coefficients.
- (ii) How are activity coefficients of electrolytes determined?

19. (a) A H<sub>2</sub>/O<sub>2</sub> fuel cell is based on platinum electrodes. The anodic exchange current density is  $1.00 \times 10^{-1} \text{ Am}^{-2}$  and the cathodic current density is  $1.00 \times 10^{-3} \text{ Am}^{-2}$ . Find the efficiency of the cell when operated at  $i = 0.300 \text{ Am}^{-2}$ . (Take  $\alpha = 0.500$ ,  $R = 0.500 \Omega$  and  $I\delta/I_{\text{max}} = 0.500$  at both electrodes,  $T = 350 \text{ K}$ )

Or

- (b) (i) What is polarographic maximum? How is it suppressed?
- (ii) Write the principle and applications of electrodeposition
- (iii) What are the advantages of chronopotentiometry?

20. (a) (i) Draw Jablonski diagram and explain the various photophysical pathways.
- (ii) Discuss the mechanism of quenching.

Or

- (b) (i) Write notes on chemical actinometers
- (ii) Describe the functioning of Frick's dosimeter and how its lower and upper limits of sensitivity can be increased.

(6 pages)

Reg. No. : .....

Code No. : 7873

Sub. Code : PCHM 12

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

First Semester

Chemistry – Core

INORGANIC CHEMISTRY – I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- The number of electrons in the  $\sigma_{2p}$  molecular orbital in  $N_2^+$  is
  - 3
  - 0
  - 1
  - 2
- Among the following paramagnetic species is
  - $B_2$
  - $C_2$
  - $O_2$
  - CO

3. Among this which is the soft acid
- (a)  $\text{Cu}^+$  (b)  $\text{K}^+$   
(c)  $\text{Na}^+$  (d)  $\text{H}^+$
4. Among this which is aprotic solvent
- (a) HF (b) MeOH  
(c)  $\text{N}_2\text{O}_4$  (d) MeCN
5. An example for metal deficiency defect is
- (a) NaCl (b) AgCl  
(c) FeS (d) CsCl
6. The number of chloride ions present per unit of CsCl
- (a) 6 (b) 8  
(c) 1 (d) 4
7. Alloys of Lanthanides are called as
- (a) Misch metals (b) Metalloids  
(c) Plate metal (d) Actinides



8. Elements that form oxocations are
- (a) Lanthanides                      (b) Actinides  
(c) Noble gases                      (d) Alkali metals.
9. The reaction  ${}_5B^8 \rightarrow {}_4Be^8$  takes place due to
- (a)  $\alpha$  - decay                      (b)  $\beta$  - decay  
(c) electron capture                (d) positron decay
10. Which of the following is used as neutron absorber in nuclear reactors?
- (a) Water                              (b) Deuterium  
(c) Uranium                          (d) Cadmium

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).  
Each answer should not exceed 250 words.

11. (a) Describe the structures of  $XeO_3$ ,  $XeO_2F_2$ ?

Or

- (b) Calculate the lattice energy of NaCl crystal with help of Born lande equation?

$$(z^+ = z^- = 1, e = 4.8 \times 10^8 \text{ esu}, N = 6.0238 \times 10^{23}, r_0 = 2.76 \times 10^8 \text{ cm}, A = 1.7476)$$

12. (a) Write the application of Hard soft acid and base?

Or

- (b) Write short note on leveling effect?

13. (a) What are the differences between Schottky and Frenkel defects?

Or

- (b) Write a short note on BCS theory.

14. (a) Write about any two separation techniques for lanthanides.

Or

- (b) State and explain the spectral and magnetic properties of actinides.

15. (a) Explain the spontaneous fission reaction with examples?

Or

- (b) Discuss radio chromatography.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)  
Each answer should not exceed 600 words.

16. (a) Account on M.O. diagram of heteronuclear diatomic molecule with example.

Or

- (b) Give a detailed account on Kapustinski equation and bent rule?

17. (a) Explain the four concepts of acid and bases?

Or

- (b) Write the reactions taking place in liquid sulphur dioxide?

18. (a) Describe the crystal structure of zinc blende?

Or

- (b) Write the briefly optical and electrical properties of semiconductors?

19. (a) Explain lanthanide and actinides contraction?

Or

- (b) Explain similarities between lanthanide and actinides?



20. (a) Write a note on nuclear fusion reaction with example.

Or

- (b) Write a note on photonuclear reaction and radiometric titrations.
-

Reg. No. : .....

Code No. : 7166

Sub. Code : PCHM 42

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL, 2019.

Fourth Semester

Chemistry

## INORGANIC CHEMISTRY — IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Mossbauer spectra are almost always obtained on solids employing solid sources. Why?
- For a gaseous molecule, the recoil energy is in the range of  $10^{-1}$  eV, which is very much larger than the typical Doppler energy
  - The recoil energy is small when the solid sample is kept in a crystal so that the mass is effectively that of the crystal
  - In the solid state the width of the resonance lines are very much reduced
  - All of the above

- The complex,  $[\text{Co}(\text{en})_3]^{3+}$  shows positive cotton effect. What is its absolute configuration?
  - $\Delta$ -(D)- $[\text{Co}(\text{en})_3]^{3+}$
  - $\Delta$ -(L)- $[\text{Co}(\text{en})_3]^{3+}$
  - $\Lambda$ -(D)- $[\text{Co}(\text{en})_3]^{3+}$
  - None of these
- In the PES of carbon dioxide, the vibrational spacing of 13.78 eV band is  $1270 \text{ cm}^{-1}$ . What is the nature of the molecular orbital? (In free  $\text{CO}_2$  molecule,  $\nu_{\text{CO}_2}$ ,  $1388 \text{ cm}^{-1}$ ).
  - Bonding molecular orbital
  - Anti-bonding molecular orbital
  - Non-bonding molecular orbital
  - None of the above
- The three maxima observed in the first band of photoelectron spectra of  $\text{CH}_4$  at 13.6, 14.4 and 15.0 eV are due to ————
  - predissociation
  - Jahn-Teller distortion
  - ejection of electron from bonding MO
  - None of these
- Which among the following is iron transport protein?
  - Phytocheline
  - Pseudobactin
  - Desferrioxamine
  - All of these.

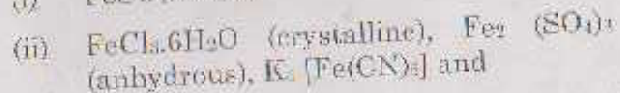
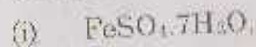
Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) The Mossbauer tin ( $^{119}\text{Sn}$ ) isomer shifts (relative to grey tin metal,  $IS = 0.00$ ) are positive for  $\text{Sn(II)}$  salts and negative for  $\text{Sn(V)}$  compounds. Why?

Or

- (b) Discuss Mossbauer spectrum of the following compounds :



12. (a) What are satellite peaks in XPS? Describe the mechanism of formation of such peaks. Give their applications in qualitative analysis?

Or

- (b) Describe the applications of photoelectron spectroscopy in explaining the structure and bonding of metal carbonyls.

6. The expected exponent for the  $\text{O}_2$  in the oxygenation (equilibrium) Constant equation for hemoglobin —————

- (a) 4 (b) 2  
(c) 2.3 (d) 4.8.

7. The drug used to treat alcoholism is —————

- (a) Allopurinol (b) Antabuse  
(c) Alloxanthine (d) All of these.

8. Which of the following compounds is used to treat Wilson's disease?

- (a) D-Penicillamine  
(b) 2, 3-dimercaptopropan-1-ol  
(c)  $\text{K}_2[\text{Ca}(\text{EDTA})]$   
(d) All of these.

9. A large single crystal of silicon is prepared by ————— process.

- (a) Hydrothermal method  
(b) Czochralski process  
(c) Sol-gel process  
(d) Epitaxy method

10.  $\beta$ -Tel is a metastable phase formed at 465 to 470 K. Suggest an appropriate method of preparation.

- (a) hydrothermal synthesis  
(b) sealed tube method  
(c) precipitation method  
(d) none of the above.



13. (a) What are ferredoxins and Rubredoxins? Discuss their structures and biological functions.

Or

(b) What are siderophores? Discuss the structures any two siderophoras.

14. (a) Discuss the mode of action of carboxypeptidase A in the hydrolysis of an amide linkage in a polypeptide.

Or

(b) How are the following chelating agents can be used therapeutically? Give their mode of actions.

(i) D-penicillamine and

(ii) cis-diamminedichloroplatinum (II)

15. (a) What are zeolites? Explain the structure and properties of zeolites.

Or

(b) Write a note on fullerenes and fullerides.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the applications of Mossbauer spectroscopy in determination of  
(i) Spin state crossover (SCO) and  
(ii) Cis-Trans isomers. (4 + 4 = 8)

Or

(b) Answer the following :

(i) What effect does the increasing 's' electron density has on the isomer shift of  $^{57}\text{Fe}$   $^{119}\text{Sn}$  compounds? Why?

(ii) MP spectrum of  $\text{SnF}_4$  show quadrupole splitting and  $\text{SnCl}_4$  shows no quadrupole splitting. Why?

(iii) The isomer shift of the following compounds increases in the order :

$\text{K}_2\text{FeO}_4 < \text{FePO}_4 < \text{FeF}_2 < \text{Fe}^+ (\text{NaCl})$ .  
Give reason.

(iv) The isomer shift of  $^{119}\text{Sn}(\text{C}_2\text{H}_5)_2$  is  $3.74 \text{ mm s}^{-1}$ . Whether the compound contains Sn (II) or Sn (IV). Explain.

(4 × 2 = 8)

17. (a) (i) State and explain Koopmans theorem. What is the main drawback of the theorem? With the help of theorem explain the UPS spectrum of molecular nitrogen. (6)

(ii) The second band in UPS spectrum of nitrogen shows vibrational progression with an interval of 0.225 and the first band of oxygen has vibrational progression with an interval of 0.22 eV. Deduce the nature of the molecular orbitals. (Given :  $\nu_1 = 2345 \text{ cm}^{-1}$ ;  $\nu_2 = 1568 \text{ cm}^{-1}$ ). (2)

Or

(b) Discuss the photoelectron spectra of the following molecules :

(i) N (1s) XPS of  $[\text{Co}(\text{en})_2(\text{NO}_2)_2]\text{NO}_3$  and C (1s) XPS of  $\text{CCl}_3\text{CH}_3$ . (3)

(ii) UV-PES of  $\text{NH}_3$  and  $\text{CO}_2$ . (5)

18. (a) What are metalloporphyrins? Explain the structure and functions of hemoglobin.

Or

(b) Discuss the structure, redox properties and biological functions of vitamin  $\text{B}_{12}$ .

19. (a) Write a brief account of (i) Inhibition and poisoning of enzyme action (ii) Blue copper proteins.

Or

(b) Discuss the structure and role of superoxide dismutase.

20. (a) Discuss the structures and properties of pillared clays.

Or

(b) Explain the epitaxy, chemical vapour transport and solution methods for the preparation of single crystals with suitable examples.



(6 pages)

Reg. No. : .....

Code No. : 7156

Sub. Code : PCHE 11

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

First Semester

Chemistry — Elective

ADVANCED TOPICS IN CHEMISTRY - I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Green chemistry is also addressed as

- (a) Sustainable chemistry
- (b) Reversible chemistry
- (c) Unnatural chemistry
- (d) Alchemy.

2. Which of the following reactions is an atom economic reaction?

- (a) Diels Alder reaction
- (b) Wittig reaction
- (c) Wurtz reaction
- (d) None of these.

3. Which of the following can not help to study the morphology of the nanoparticles?

- (a) AFM
- (b) TEM
- (c) SEM
- (d) ESR

4. Which of the following statement is wrong?

- (a) Fullerene has a soccer ball structure
- (b) Fullerene has 60 carbon atoms
- (c) Fullerene is an allotropy of carbon
- (d) Fullerene is a polymer of diamond.

5. Which of the following is immune to electrochemical corrosion?

- (a) Zinc
- (b) Magnesium
- (c) Cadmium
- (d) Graphite.



6. Corrosion of polymers can occur due to
- Ionising radiation
  - Free Radicals
  - Oxidation
  - All the above.
7. Typical HPLC column has a diameter between
- 2 to 5 mm
  - 2 to 5 cm
  - 10 to 50 mm
  - 10 to 50 cm.
8. The basic equation that helps to analyse the results of colorimetry is
- Hooke's law
  - Woodward Hoffmann rules
  - Beer Lambert's law
  - None of these.
9. During the power generation, the nuclear fuel undergoes
- Nuclear fission
  - Nuclear fusion
  - Both nuclear fission and nuclear fusion
  - Neither nuclear fusion nor nuclear fission.

10. The most capable solar cell known to date can give
- 100 % efficiency
  - 4 -5 % efficiency
  - 40 - 50 % efficiency
  - None of these.

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Differentiate between field and atom economy of a reaction.
- Or
- (b) Indicate the need to avoid unnecessary derivitisation during organic synthesis.
12. (a) Describe the methods of characterising the nanomaterials.
- Or
- (b) Indicate how lasers are useful in the synthesis of nanomaterials.
13. (a) Explain how the extent of corrosion can be analysed by weight loss method.
- Or
- (b) Write a note on potentiodynamic polarisation.

14. (a) Explain the principle of GC - MS.

Or

(b) Distinguish between mobile phase and stationary phase.

15. (a) Discuss the role of photo electrochemical cell in water splitting.

Or

(b) Describe the fate of nuclear fuels after their usage.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Write notes on :

(i) Microwaves in oxidation and reduction reactions

(ii) Solventless reactions.

Or

(b) Write notes on :

(i) Renewable energy

(ii) Convergent synthesis

(iii) Transportation.

17. (a) Describe the chemical methods of synthesising nano materials.

Or

(b) Discuss the properties of nano materials with special references to their optical and electronic properties.

18. (a) Write a note on corrosion inhibition techniques.

Or

(b) Describe the corrosion monitoring methods.

19. (a) Write a note on cyclic voltammetry.

Or

(b) Give a detailed account of atomic absorption spectroscopy.

20. (a) Discuss the scope of using hydrogen as an energy alternate.

Or

(b) What are fuel cells? Explain their construction and applications.

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(6 pages)

Reg. No. : .....

Code No. : 7876

Sub. Code : PCHM 21

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Second Semester

Chemistry

ORGANIC CHEMISTRY – II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer :

1. Chromophores like ethylene and acetylene may undergo ——— transition.  
(a)  $n - \pi^*$   
(b)  $\pi - \pi^*$  and  $n - \pi^*$   
(c)  $n - \pi^*$   
(d) none of these



2. In IR spectra the intramolecular hydrogen bond gives rise to \_\_\_\_\_ bands.
- (a) Sharp                                      (b) Broad
- (c) Both (a) and (b)                      (d) None of these
3. Normant reagent is \_\_\_\_\_
- (a) copper sulphate
- (b) alkyl copper magnesium bromide
- (c) Trimethyl silyl halide
- (d) allylic acid
4. 1,4 cyclohexadiene can be prepared from benzene with liquid ammonia and \_\_\_\_\_
- (a) Zn with propyl alcohol
- (b) Cu with propyl alcohol
- (c) Na with propyl alcohol
- (d) Cu with ethanol
5. \_\_\_\_\_ are called carbenoids because they readily give  $\alpha$ -elimination to lose a group without electron pair.
- (a) Alkyl halides
- (b)  $\alpha$ -halo organometallic compounds
- (c)  $\alpha, \beta$  unsaturated aldehyde
- (d) None of these

6. Dimerization of aryl nitrenes give \_\_\_\_\_
- (a) diimide (b) alkyl nitrenes  
(c) acyl nitrenes (d) azobenzene
7. Penicillamine gives indigo color reaction with  $\text{FeCl}_3$  solution, this show the presence of \_\_\_\_\_ group,
- (a) Carboxyl (b) Phenolic  
(c) Thiol (d) Amino
8. Cocaine when heated with water gives \_\_\_\_\_
- (a) benzoyl econine  
(b) econine and benzoic acid  
(c) econine  
(d) benzoic
9. Monoterpenoids contain \_\_\_\_\_ carbon atoms
- (a) 10 (b) 11  
(c) 15 (d) 25
10. Ascorbic acid with aqueous iodine solution converts to
- (a) dehydro ascorbic acid  
(b) threonic acid  
(c) oxalic acid  
(d) D-(+) tartaric acid

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Discuss the various types of electronic transitions.

Or

- (b) Explain optical rotatory dispersion.

12. (a) Describe the unimolecular aromatic nucleophilic substitution reaction mechanism with suitable examples.

Or

- (b) Suggest the mechanism for Sharpless asymmetric epoxidation.

13. (a) Explain the structure and stability of carbenes.

Or

- (b) Discuss the mechanism of Beckmann rearrangement through nitrene intermediate.

14. (a) Suggest the biosynthetic route of tyrosine.

Or

- (b) Give an account on synthesis of chloramphenicol.



15. (a) Write down the synthesis of pyridoxine from ethoxy acetyl acetone.

Or

- (b) Outline the synthesis of camphor.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the electronic effects and hydrogen bonding in the absorption frequencies of IR with suitable examples.

Or

- (b) Describe axial halo keto rule with two evidences.

17. (a) Write notes on :

- (i) Michael addition
- (ii) Mannich reaction.

Or

- (b) Discuss the mechanism of Wittig reaction and Dieckmann condensation and explain their synthetic importance.

18. (a) Describe the structure, stability and reaction of aryne.

Or

- (b) Outline the mechanism of Wolf rearrangement of acyl carbenes and its synthetic applications.

19. (a) How do you establish the structure of D- penicilamine?

Or

- (b) Outline the synthesis of reserpine.

20. (a) Establish the structure of a- tocopherol.

Or

- (b) Elucidate the structure of zingiberene.
-

Code No. : 7167

Sub. Code : PCHM 43

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Fourth Semester

Chemistry - Core

## PHYSICAL CHEMISTRY - IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A - (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. For a linear diatomic simple harmonic oscillator model, origin of perpendicular vibrations is
- (a)  $\Delta J = 0$  and  $\Delta v = \pm 1$
- (b)  $\Delta J = \pm 1$  and  $\Delta v = 1$
- (c)  $\Delta J = 0$  and  $\Delta v = +1, \pm 2, \pm 3$
- (d) Both (a) and (b)

2. The weak *h* band arises due to the  $v = 1$  to  $v = 2$  transition is known as
- (a) fundamental band
- (b) first overtone band
- (c) second overtone band
- (d) hot band
3. Which of the following is called red Laser?
- (a) He-Ne Laser      (b) Ar Laser
- (c) Ar-Laser      (d) Kr-Laser
4. Which of the following molecules is / are symmetric top?
- (a) Chloroform
- (b) Chloromethane
- (c) Phosphorous trichloride
- (d) All of these
5. The 1967 Nobel prize for the contributions to fast reaction kinetics was won by
- (a) Manfred Eigen      (b) Norrish
- (c) Porter      (d) All of them



6. Absolute Reaction Rate Theory (ARRT) was developed by

- (a) Eyring (b) Polanyi  
(c) Evans (d) All of them

7. For a reaction between two ions, the plot of  $\log k$  versus  $\sqrt{\mu}$  gives a straight line with slope equal to +2. What are the charges of the ions?

- (a) -2 and -1  
(b) -2 and +1  
(c) +2 and -1  
(d) Both (b) and (c) are correct

8. The reaction,  $H + O_2 \rightarrow HO + O$ , is an example of

- (a) chain initiation  
(b) propagation  
(c) chain branching  
(d) termination

9. Which of the following processes is an example of heterogeneous catalysis involving solid catalyst and gaseous reactants?

- (a) Hydrogenation of alkenes by Wilkinson catalyst  
(b) Haber process for the production of ammonia  
(c) Contact process for the manufacture of sulphuric acid  
(d) All of these

10. In enzyme catalysis the rate / [S] vs rate plot is called

- (a) Michaelis - Menton plot  
(b) Lineweaver - Burk plot  
(c) Eadie's plot  
(d) Langmuir - Rideal Plot

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b), each answer should not exceed 250 words.

11. (a) How many modes of vibrations are there for  $H_2O$  molecule? Sketch the symmetry of fundamental modes of vibrations of them.

Or

(b) The force constant of CO molecule is  $1840 \text{ Nm}^{-1}$ . Calculate the vibrational frequency in  $\text{cm}^{-1}$ . The atomic masses are  $^{12}\text{C} = 19.923 \times 10^{-27} \text{ kg}$  and  $^{16}\text{O} = 26.564 \times 10^{-27} \text{ kg}$ .

12. (a) Describe the quantum theory of Raman effect.

Or

(b) What do you mean by polarized and depolarized Raman line? In what way it is related to the symmetry of vibrations?

13. (a) Discuss the kinetics of reactions taking place in flow systems involving stopped flow.

Or

(b) Describe the Lindemann hypothesis for the study of unimolecular reaction.

14. (a) Derive Hammett equation and give the significances of substituents and reaction constants.

Or

(b) What are chain reactions? Give their characteristics.

15. (a) Give the expression for BET adsorption isotherm and explain the terms in it.

Or

(b) Explain the effect of pH and temperature on the rate of enzymic catalysed reactions.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b), each answer should not exceed 600 words.

16. (a) Given that  $\bar{\nu}_c = 536.10 \text{ cm}^{-1}$  and  $x_e \bar{\nu}_c = 3.4 \text{ cm}^{-1}$  for  $^{23}\text{Na}^{19}\text{F}$  gas. Calculate the frequencies of first and second vibrational overtone transitions.

Or

(b) Describe the vibration-rotation spectra of diatomic molecules with the help of energy level diagram and give the selection rules for P, Q and R branch lines.

17. (a) Describe the principle, characteristics and types of Lasers used in Raman spectroscopy.

Or

(b) Describe the applications of IR and Raman spectroscopy in the determination of structure of molecules with proper examples.

18. (a) Describe the thermodynamic formulation of transition state theory.

Or

(b) (i) Describe the application of NMR method in the study of fast reactions.

(ii) Write a note on Slater theory of unimolecular reactions.

19. (a) Derive an equation for the influence of pressure of solvent on rate and explain the significance of volume of activation.

Or

- (b) Explain the kinetics and mechanism of  $H_2-Br_2$  reaction with the help of steady state approximation.

20. (a) Discuss Freundlich adsorption isotherm and Langmuir adsorption isotherm.

Or

- (b) What do you mean by acidity function? Explain the general pattern of acid-base catalyzed reactions with the help of  $\log k$  vs pH plot.
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(6 pages)

Reg. No. : .....

Code No. : 7154

Sub. Code : PCHM 12

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

First Semester

Chemistry — Core

INORGANIC CHEMISTRY — I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1.  $\text{NH}_4^+$  ion has a valence electrons. What is the shape of the molecule according to Walsh's diagram?
- (a) Square planar  
(b) Tetrahedral  
(c) Trigonal planar  
(d) Linear

2. Which one of the following statements is correct for  $\text{XeO}_2\text{F}_2$ ?
- (a) It has a trigonal bipyramid based structure  
(b) It has a square planar structure  
(c) It has a tetrahedral structure  
(d) It has a isostructural with  $\text{XeF}_4$
3. Mangarate (VI) ions are unstable in aqueous solution and undergo disproportionation to Mn (VII) and Mn (II). why?
- (a) The difference of the standard potentials of the species is +0.73 V  
(b) The K for the disproportionation reaction is  $10^{50}$  at 298 K.  
(c) In Latimer diagram the potential on the right of the species is higher than the potential on the left  
(d) All of the above
4. What is the specific conductance of Liq.  $\text{NH}_3$ ?
- (a)  $6 \times 10^{-11}$                       (b)  $5 \times 10^{-9}$   
(c)  $6 \times 10^{-9}$                       (d)  $5 \times 10^{-11}$

5. Which of the following alkali metal halides has the lowest lattice energy?
- (a) NaCl (b) KBr  
(c) CsI (d) LiF
6. Which of the following metal oxides do not adopt spinal structure.
- (a)  $\text{CO}_3\text{O}_4$  (b)  $\text{Fe}_3\text{O}_4$   
(c)  $\text{Mn}_3\text{O}_4$  (d) None
7. Alloys of Lanthanide are called as
- (a) Mish metals (b) Metalloids  
(c) Plate metals (d) None of these
8. Lanthanide are extracted from
- (a) Cassiterite (b) Limonite  
(c) Monozite (d) Magnetite
9. The energy of sun is produced by
- (a) Nuclear fission  
(b) Radioactive reaction  
(c) Lambert's law  
(d) Nuclear fusion

10. The average number of neutrons produced during the nuclear fission of uranium 235 is
- (a) Internal quenching  
(b) 4 electrons  
(c) 5 electrons  
(d) 2.5 electrons

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Discuss the structures of  $\text{XeF}_2$ ,  $\text{XeF}_6$ .
- Or
- (b) Write short note on Born Haber cycle.
12. (a) Give an brief account of Bronsted – Lowery concept.
- Or
- (b) What are the factors affecting redox potential?
13. (a) Describe the consequences of schottky defects.
- Or
- (b) Explain Meissonier effect.



14. (a) Explain briefly lanthanide contraction.

Or

(b) How do you extract lanthanides from monazite sand?

15. (a) Explain the theory of nuclear fission reaction.

Or

(b) Describe the neutron activation analysis.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe M.O. diagrams of any two heteronuclear diatomic molecules.

Or

(b) Give a detailed account on:

(i) Walsh diagram

(ii) Bron-Lande equation.

17. (a) Explain the four concepts of acid and bases.

Or

(b) Write the reactions taking place in liquid ammonia.

18. (a) Explain Schottky and Frenkel defects.

Or

(b) Write briefly optical and electrical properties of semiconductors.

19. (a) (i) Describe the magnetic behaviour of lanthanides and actinides.

(ii) Calculate  $\mu_s$  and  $\mu_{eff}$  for  $\gamma b^{3+}$ .

Or

(b) Explain difference between lanthanide and actinides.

20. (a) Write a note on nuclear fusion reaction with example.

Or

(b) Write a note on radiometric titrations and neutron absorptiometry.

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(8 pages)

Reg. No. : .....

Code No. : 7161

Sub. Code : PCHM 31

M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Third Semester

Chemistry — Core

ORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

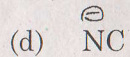
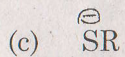
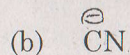
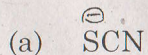
Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which among the following is not an ambident nucleophile?

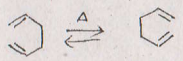


2. If NGP occurs at asymmetric carbon, then the product obtained is \_\_\_\_\_ of configuration
- (a) 100% retention  
(b) 70% inversion + 30% retention  
(c) 100% inversion  
(d) 50% inversion + 50% retention
3. In high resolution NMR spectrophotometer, the — OH proton of pure ethyl alcohol shows \_\_\_\_\_
- (a) Quartet                      (b) Singlet  
(c) Doublet                      (d) Triplet
4. Vicinal coupling constant value is maximum at dihedral angle of \_\_\_\_\_ and \_\_\_\_\_
- (a)  $0^\circ$  and  $90^\circ$   
(b)  $0^\circ$  and  $180^\circ$   
(c)  $90^\circ$  and  $180^\circ$   
(d)  $90^\circ$  and  $270^\circ$
5. The most abundant peak in the mass spectrum of a compound is known as \_\_\_\_\_ peak
- (a) base                              (b) molecular ion  
(c) metastable                      (d) parent ion



6. Which among the character is shown by metastable peak?
- They are much sharper than the normal peaks
  - They occur at the integral m/e values
  - They are much broader than the normal peaks
  - They are of relatively more abundance

7. When photo chemically excited Ketone is added to an olefin oxetane is formed. This is an example of \_\_\_\_\_ reaction
- Paterno-Buchi
  - Norrish type-I
  - Norrish type-II
  - Cis-trans isomerisation

8.  The above reaction is an example of \_\_\_\_\_ reaction
- Electrolytic
  - Cycloaddition
  - Intermolecular hydrogen shift
  - Sigmatropic

9. When coumarin is heated with sodium ethoxide \_\_\_\_\_ is formed
- Coumarinic acid
  - Coumaric acid
  - Benzopyrrylium
  - Chrome

10. The decreasing order of reactivity among 1, 3 - azoles is \_\_\_\_\_
- oxazole < Thiazole < Imidazole
  - Thiazole > Imidazole > Oxazole
  - Imidazole > Thiazole > Oxazole
  - Oxazole > Imidazole > Thiazole

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain E<sub>2</sub> mechanism with evidences.

Or

- (b) When 2-chloro-2-methyl butane is heated with a base 2-methyl-2-butene is formed as major product and 2-methyl-1-butene is formed as minor product. Give explanation. State the rule which govern this explanation.

12. (a) Among ethylene proton and acetylene proton which has high chemical shift value? Give explanation for the variation in their chemical shift value.

Or

- (b) Discuss the principle of FTNMR. In what way is it more useful than conventional method? (3+2)



13. (a) Account for the formation of following peaks in the mass spectrum of

- (i) Benzoic acid, m/e 122, 105, 77 and 51
- (ii) Nitrobenzene, m/e 123, 93, 77, 65, and 51.

Or

(b) Write down the fragmentation pattern of pentan-2-one and n-butyl alcohol.

14. (a) Discuss the radiative processes occurring in the photo excited state of an organic compound.

Or

(b) Under photochemical condition how is norbornene reacts with

- (i) Acetone and (ii) acetophenone. Write down the mechanism in each case.

15. (a) Discuss the structure of maltose.

Or

(b) Write any two synthesis of thiazole. What happens when thiazole is heated with (i) Br<sub>2</sub> (ii) Oleum.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Discuss the effect of solvents with the rate of aliphatic nucleophilic substitution bimolecular reaction. (6)
- (ii) Methyl bromide undergo nucleophilic substitution more readily compared to that of methyl chloride. Give reason. (2)

Or

(b) Account for the following

- (i) Methyl chloride, a 1° halide undergo nucleophilic substitution more likely via, S<sub>N</sub>2 pathway while t-butyl chloride (3° halide) and allyl chloride (1° halide) undergo the same more likely via S<sub>N</sub>1 pathway.
- (ii) Ph  $\text{S} \sim \text{CH}_2$  undergo hydrolysis 600 times faster than  $\text{CH}_2$ .

17. (a) Discuss the principle of proton decoupled C-13 NMR spectroscopy and off-resonance proton decoupled c-13 NMR spectroscopy. How far the latter is superior over former? (6+2)

Or



- (b) Explain the following each with an example
- NOE
  - $H^1 - H^1 \cos y$
  - Proton exchange reaction. (3+3+2)

18. (a) Explain the following spectral data shown by an organic compound  $C_8H_{10}O_2$  and assign the structure of the compound.

UV : No  $\lambda_{max}$  above 250 nm.

IR :  $2950 \text{ cm}^{-1}$ ; 1.96 (3H, S); 5.0 (2H, S) and 7.2 (5H, S)

Off-resonance  $C^{13}NMR$  : 25.9 (q); 136 (s); 23.2 (t); 171 (s)

129 (two doublets) ; 126 (two doublets); 121 (d) m/e value :  $m^+$  134, 119, 91 and 65.

Or

- (b) An organic compound shows the following spectral data. Assign the structure for if the compound.

Molecular weight : 69.

UV : No  $\lambda_{max}$  above 200 nm.

IR :  $2941 \text{ cm}^{-1}$ ,  $2273 \text{ cm}^{-1}$  and  $1458 \text{ cm}^{-1}$

NMR :  $\delta$  2.70 (septet,  $J = 6.7$  CPs; 4.2 squares)

$\delta$  1.33 (doublet,  $J = 6.7$  cps; 25.8 squares).

19. (a) Construct correlation diagram for  $\pi 4S + \pi 2s$  cycloaddition and prove that the reaction is thermally allowed.

Or

- (b) Write down the mechanism of norrish type I reaction and cis-trans isomerisation of stilbene under sensitised condition.

20. (a) Write down the following conversions.

- Pyridazine from maleic anhydride
- Pyrimidine from uracil
- Flavone from flavanone
- Coumarin from salicylaldehyde.

Or

- (b) (i) Write down the synthesis of quercetin. (4)
- (ii) Write down the pyranose ring structure of glucose and pyranose and furanose ring structure of fructose. (4)

(6 pages)

Reg. No. : .....

Code No. : 7878

Sub. Code : PCHM 23

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Second Semester

Chemistry – Core

PHYSICAL CHEMISTRY – II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

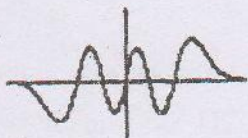
PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer :

1. For the hydrogen atom, which of the following orbitals has the lowest energy \_\_\_\_\_.  
(a) 4s  
(b) 4p  
(c) 4d  
(d) They all have the same energy

2. The illustrated wave function represents the state of the linear harmonic oscillator with  $n =$  \_\_\_\_\_



- (a) 2                                      (b) 3  
(c) 5                                      (d) 6
3. No two electrons in an atom will have all the four quantum numbers same. This statement is known as \_\_\_\_\_.
- (a) Exclusion rule  
(b) Uncertainty principle  
(c) Aufbau principle  
(d) Hund's rule
4. None of the four quantum numbers can have a value which is
- (a) Negative  
(b) Infinite  
(c) Zero  
(d) Fractional non-integral



5. The \_\_\_\_\_ is an equation in electrochemical kinetics relating the rate of an electrochemical reaction to the over potential.
- (a) Butler-Volmer equation
  - (b) Onsager equation
  - (c) Debye equation
  - (d) Bronsted equation
6. \_\_\_\_\_ is defined as, the fraction of the total current carried either by the anion or the cation in electrolysis.
- (a) Wien effect
  - (b) Transference number
  - (c) Falkenhagen effect
  - (d) Arrhenius theory
7. \_\_\_\_\_ is a non-electrolytic finishing process that makes stainless steel more rust-resistant.
- (a) Alloying
  - (b) Tinning
  - (c) Galvanizing
  - (d) Passivation
8. Micro electrode in polarography is generally \_\_\_\_\_.
- (a) DME
  - (b) Working electrode
  - (c) Indicator electrode
  - (d) All of these

9. \_\_\_\_\_ is the production and emission of light by a living organism.
- (a) Bioluminescence (b) Fluorescence  
(c) Chemiluminescence (d) Phosphorescence
10. The process of determining the age of a fossil is known as \_\_\_\_\_.
- (a) Irradiation (b) Radioactive dating  
(c) Carbon dating (d) Smoke detecting

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the one dimensional simple harmonic oscillator.

Or

- (b) Write a note on the rigid rotator.

12. (a) Explain the rule of Mutual Exclusion principle for CO<sub>2</sub> molecule.

Or

- (b) What does the MO of H<sub>2</sub><sup>+</sup> look like? What is its bond order? What is its magnetic property? Explain.

13. (a) Write Butler-Volmer and Tafel equations.

Or

(b) Explain the Helmholtz model.

14. (a) Explain the Ilkovic equation. Explain the terms involved.

Or

(b) What is an Evans diagram? Explain.

15. (a) Write brief notes on chemical actinometers.

Or

(b) Write brief note on Photosensitisation and Chemiluminescence.

PART C — ( $5 \times 8 = 40$  marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Derive the *scrödinger* wave equation for Particle in 1 D box.

Or

(b) Give a brief account on quantum mechanical tunnelling.



17. (a) Brief in detail about Born-Oppenheimer approximation.

Or

- (b) Explain the formation  $H_2$  molecule on the basis of valence bond theory.

18. (a) Derive and explain Debye-Huckel theory of strong electrolyte with experimental verification.

Or

- (b) Discuss the Activity and Activity Coefficients of non-electrolytes.

19. (a) What are fuel cells? How will you classify them? How do fuel cell works?

Or

- (b) Define corrosion. Give the types of corrosion. What are the factors influencing corrosion? How will you prevent the corrosion?

20. (a) Draw and explain the each term of Jablonski diagram.

Or

- (b) Illustrate the applications of radiation chemistry.

(7 pages)

Reg. No. : .....

Code No. : 7155

Sub. Code : PCHM 13

M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

First Semester

Chemistry — Core

PHYSICAL CHEMISTRY — I

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The Gibb's Potential is defined as

- (a)  $G = E - PV + TS$
- (b)  $G = E + PV + TS$
- (c)  $G = E - PV - TS$
- (d)  $G = E + PV - TS$

2. Gibb's thermodynamical potential can be represented as  $G = H - TS$ . Which relation hold true?

- (a)  $(\partial S / \partial V)_{U,N} = -p/T$
- (b)  $(\partial S / \partial V)_{U,N} = p/T$
- (c)  $(\partial S / \partial E)_{V,N} = -p/T$
- (d)  $(\partial S / \partial E)_{V,N} = p/T$

3. What is the degrees of freedom of a system with mixture of water, liquid benzene and oxygen?

- (a) 1
- (b) 2
- (c) 3
- (d) 4

4. Free expansion is

- (a) Reversible Process
- (b) Irreversible Process
- (c) Polytropic Process
- (d) None of these

5. A Photon of wavelength  $4000 \text{ \AA}$  strikes a metal surface, the work function of the metal being 2.13 eV. The kinetic energy of the emitted photoelectron is \_\_\_\_\_

- (a) 0.97 eV
- (b) 9.7eV
- (c) 5.23eV
- (d) 3.10eV



6. A cricket ball weighing 100 g is to be located within  $0.1 \text{ \AA}$ . The uncertainty in its velocity is

- (a)  $6.626 \times 10^{-22} \text{ ms}^{-1}$   
 (b)  $66.26 \times 10^{-22} \text{ ms}^{-1}$   
 (c)  $0.6626 \times 10^{-22} \text{ ms}^{-1}$   
 (d)  $6626 \times 10^{-22} \text{ ms}^{-1}$

7. The Thermodynamic Probability for Fermions is

- (a)  $g_i / \{n!(g_i - n_i)!\}$   
 (b)  $(n_i + g_i + 1)! / \{n!(g_i - 1)!\}$   
 (c)  $\{N_i / \{n!(g_i - n_i)\}\}$   
 (d)  $\sum_i N_i / g_i!$

8. Grand canonical ensemble has the same values of

- (a)  $N, V$  and  $E$                       (b)  $V, T$  and  $\mu$   
 (c)  $N, V$  and  $T$                       (d)  $N, V$  and  $\mu$

9. Symmetric top molecules have

- (a) Two moments of inertia equal and third different  
 (b) All the three moments of inertia equal  
 (c) All the three moments of inertia different  
 (d) None of the above

10. In case of asymmetric top molecules, the moments of inertia are

- (a)  $I_x = I_y = I_z$                       (b)  $I_x \neq I_y \neq I_z$   
 (c)  $I_x < I_y = I_z$                       (d)  $I_x = I_y = I_z$

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Deduce the relationship

$$\mu = -1/C_p \left\{ \partial H / \partial P \right\}_T.$$

Or

(b) Using equation  $\mu = \mu^\circ + RT \ln f$  in f, show that  
 $x_1 \left[ \partial \ln f_1 / \partial x_1 \right]_{P,T} = x_2 \left[ \partial \ln f_2 / \partial x_2 \right]_{P,T}.$

12. (a) (i) Find the maximum number of Phases that can co-exist in a single-component condensed system if the degrees of freedom is zero.  
 (ii) What is the degree of freedom for single-phase fields on the phase diagram?

Or

(b) Discuss the applications of irreversible thermodynamics to biological and nonlinear systems.



13. (a) Calculate the de Brogue's wavelength of an electron travelling at 1% of the speed of light. ( $m = 9.1095 \times 10^{-31}$  Kg).

Or

- (b) What is the uncertainty in the velocity if we wish to locate an electron within an atom, so that  $\Delta q = 50$  pm,  $m = 9.1095 \times 10^{-31}$  Kg.

14. (a) Evaluate the rotational entropy of nitrogen gas at 25°C, Given that  $I = 1.39 \times 10^{-46}$  kg m<sup>2</sup>.

Or

- (b) If  $E = RT^2 (\partial \ln Q / \partial T)_v$ , Find the molar heat capacity of an ideal gas at constant volume in terms of partition function.

15. (a) What are the degeneracies of the following diatomic rotational energy levels?

- (i) 0                      (ii)  $h^2 / 4\pi^2 I$ .

Or

- (b) Write notes on

- (i) Collision broadening and  
(ii) Doppler broadening.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) According to Virial equation of gas  $\ln f/P = BP + CP^2/2 + DP^3/3$ . Calculate the Fugacity of the gas. Given that  $P = 100$  atm,  $B = -1.73 \times 10^{-3}$ ,  $C = 4.38 \times 10^{-7}$ ,  $D = 1.7 \times 10^{-8}$ .

Or

- (b) Define activity and activity coefficients. How can you determine activity and activity coefficients for non-electrolytes?

17. (a) Discuss the phase rule to a three component system forming one, two and three azeotropes of partially miscible liquids.

Or

- (b) Derive an expression for entropy production in matter flow.

18. (a) Derive the Schrodinger time independent wave equation. Mention its applications.

Or

- (b) Discuss the Postulates of quantum mechanics.

19. (a) (i) Compare the important features of Maxwell-Boltzmann (MB), Bose-Einstein (B-E) and Fermi-Dirac (F-D) statistics

(ii) What is an ensemble? Define microcanonical, canonical and grand canonical ensemble.

Or

(b) Calculate the relative numbers of distinguishable states in ice and in water at 273° K. Given that  $\Delta H_{\text{Fusion}} = 6.0 \text{ kJ mol}^{-1}$  at 273°K, and the Boltzmann's constant  $K = 1.38 \times 10^{-23} \text{ JK}^{-1}$ .

20. (a) Explain the occurrence of pure rotational spectrum for linear symmetric top molecules.

Or

(b) (i) Calculate the relative population for  $j = 1$  for a molecule with  $B$  as  $2.0 \text{ cm}^{-1}$  at 300 °K. Boltzmann's constant  $K = 1.38 \times 10^{-23} \text{ JK}^{-1}$ .

(ii) Why microwave spectra are difficult to be observed in case of solids and liquids?



(8 pages)

Reg. No. : .....

Code No. : 7162

Sub. Code : PCHM 32

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Third Semester

Chemistry — Core

INORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

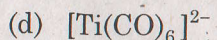
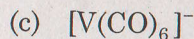
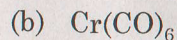
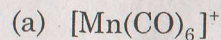
Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

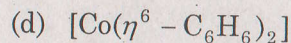
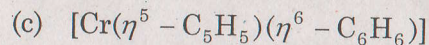
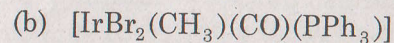
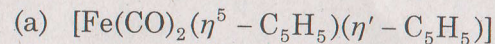
Answer ALL questions.

Choose the correct answer :

1. Which of the following species has highest IR stretching frequency?



2. Which of the following complexes obey 18-electron rule?



3. Why iodide anion is preferred in the Monsanto acetic acid Synthesis?

(a) Greater rate of oxidative addition of iodomethane

(b) The soft iodide ion is good ligand for soft Rh (I) complex

(c) Iodide easily forms five-coordinate complex,  $[\text{RhI}_3(\text{CO})_2]^{2-}$

(d) All of the above

4. Replacement of  $\text{PPh}_3$  in Wilkinson's catalyst,  $[\text{RhCl}(\text{PPh}_3)_3]$ , by  $\text{PEt}_3$  ————— the catalytic effect.

(a) increases (b) does not alter

(c) reduces (d) stop



5. Which of the following statements about the molecule  $\text{H}_2\text{C} = \text{CF}_2$  is wrong?

- (a) The two hydrogens and the two fluorines are isochronous and non-equivalent
- (b) Each proton sees two non-equivalent fluorines (one cis and one trans), which have identical chemical shifts but different  $J_{\text{H-F}}$ , coupling constants
- (c) The two hydrogens and the two fluorines are chemically and magnetically equivalent
- (d) The simple 1:2:1 triplet expected when both protons and both fluorines are equivalent is not observed in either the fluorine or the proton NMR because of the non-equivalence that exists in the J values

6. The number of ESR lines expected for the complex  $[\text{Cu}(\text{bpy})_3]^{2+}$  is

- (a) 4
- (b) 52
- (c) 90
- (d) 120

7. A substance when dissolved in water at  $10^{-4}\text{M}$  concentration absorbs 10% of an incident radiation in a path of 1 cm length. What is the molar extinction coefficient?

- (a) 1000
- (b) 10000
- (c) 437
- (d) 100000

8. For the same concentration of nickel, the absorbance at 352.4 nm was found to be about 30% greater for a solution that contained 50% ethanol than for an aqueous solution. Why?

- (a) Alcohol reduces the surface tension of the solution leading to smaller droplets
- (b) Alcohol adds its heat of combustion to the flame leading to a slightly higher temperature compared to water, which cools the flame
- (c) Alcohol changes the viscosity of the solution, which may increase the nebulizer uptake rate
- (d) All of the above

9. Excitation into the charge transfer bands often leads to \_\_\_\_\_ reactions.

- (a) photoracemisation
- (b) photosubstitution
- (c) photodissociation
- (d) photoredox

10. Which of the following complexes has highest excited state redox potential?

- (a)  $^*[\text{Cr}(\text{bpy})_3]^{2+}$
- (b)  $^*[\text{Ru}(\text{bpy})_3]^{2+}$
- (c)  $^*[\text{Ir}(\text{bpy})_3]^{3+}$
- (d)  $^*[\text{Os}(\text{bpy})_3]^{2+}$



PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe stretching mode analysis of metal carbonyls with examples.

Or

- (b) Explain the structural features of metal alkene and metal allyl complexes.

12. (a) With suitable examples explain nucleophilic and electrophilic attack of coordinated ligands in organometallic compounds.

Or

- (b) Write short note on Zeigler-Natta catalysis.

13. (a) Explain the NMR of paramagnetic complexes and contact shift with examples.

Or

- (b) EPR spectrum of  $[\text{CuSiF}_6] \cdot 6\text{H}_2\text{O}$  has single band with isotropic 'g' value at room temperature but at 20 K it has three lines with anisotropic g values. Explain.

14. (a) Explain thermometric titrations with examples.

Or

- (b) What is meant by DTA? Sketch and explain the DTA curve of calcium oxalate monohydrate in Argon and oxygen atmosphere.

15. (a) Discuss the use of  $[\text{Ru}(\text{bpy})_3]^{3+}$  in photochemical conversion and storage of solar energy.

Or

- (b) Write a note on excited state lifetime and redox potentials.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Draw the MO diagram for metallocene. Using the diagram, predict the stability and magnetic properties of manganocene, ferrocene and cobaltocene. What would happen to the M-L bond length if an electron is removed from  $[\text{Co}(\eta^5 - \text{Cp}_2)]$  to form  $[\text{Co}(\eta^5 - \text{Cp}_2)]^+$ . Justify your answer.

Or



(b) What are metal — metal bonds? With illustrative examples discuss the structures of carbonyls containing metal-metal bonds.

17. (a) (i) Explain the Wacker process of acetaldehyde production from ethylene and oxygen  
(ii) Write a note on synthetic gasoline.

Or

- (b) (i) Describe the mechanistic aspect involved in the hydroformylation of olefins by  $\text{Co}_2(\text{CO})_8$ .  
(ii) Explain the role of organometallic compounds in carbonylation of alcohols.

18. (a) (i) Sketch and explain the  $^{31}\text{P}$ -NMR of  $[\text{Rh}(\text{PPh}_3)_3\text{Cl}_3]$  and  $\text{PF}_2\text{H}(\text{NH}_2)_2$ .  
(ii) Explain the  $^1\text{H}$  and  $^{15}\text{N}$ -NMR spectrum of  $\text{NH}_3$  and compare with  $^1\text{H}$ -NMR of  $^{14}\text{NH}_4^+$  ion and  $^{14}\text{NH}_3$ .

Or

- (b) Discuss the EPR spectra of  $[\text{CrF}_6]^{3-}$ ,  $[\text{VO}(\text{H}_2\text{O})_6]^{2+}$ ,  $\text{K}_2[\text{IrCl}_6]$  and  $\text{Co}_3(\text{CO})_9\text{Se}$ .

19. (a) (i) Why in a hydrogen-Oxygen flame the atomic absorption signal for iron was found to decrease in the presence of large concentrations of sulphate? Suggest three possible methods for overcoming the potential interference of sulphate in a quantitative determination of iron.

(ii) List the types of physical and chemical changes that can yield exothermic and endothermic peaks in DTA and DSC.

(iii) Describe the difference between power-compensated and heat-flux DSC instruments.

(iv) Why does the glass transition for a polymer yield no exothermic or endothermic peak?

Or

- (b) Discuss the instrumentation required for fluorescence analysis. Suggest an experiment by which you could determine iodide ion by fluorescence analysis.

20. (a) Discuss the applications of semiconductor based photoelectrochemical cells in the storage of solar energy.

Or

- (b) Discuss in detail the photochemical reactions of  $\text{Co}(\text{III})$  complexes enumerating the role of different excited states involved in these reactions.



(7 pages)

Reg. No. : .....

Code No. : 7880

Sub. Code : PCHM 31

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry – Core

ORGANIC CHEMISTRY – III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :



This is an example for \_\_\_\_\_ reaction.

(a)  $\text{S}_{\text{N}}\text{i}$

(b)  $\text{S}_{\text{N}}\text{2}$

(c)  $\text{S}_{\text{N}}\text{1}$

(d)  $\text{E}_1$

2. The geometry of the intermediate involved in  $S_N2$  mechanism is \_\_\_\_\_ and the product has \_\_\_\_\_ configuration.
- (a) trigonal planar, inverted
  - (b) tetrahedral, retention
  - (c) trigonal planar, mixture
  - (d) tetrahedral, inverted
3. Using \_\_\_\_\_ method we can illustrate the structure of complex molecules.
- (a)  $^{13}\text{C}$  - NMR
  - (b)  $^1\text{H}$  NMR
  - (c) 2D NMR
  - (d) DEPT
4. The number of  $\text{H}^1$ -NMR peaks for p-xylene is
- (a) 1
  - (b) 2
  - (c) 3
  - (d) 4
5. The most intense peak in mass spectrum is?
- (a) metastable peak
  - (b) base peak
  - (c) isotopic peak
  - (d) satellite peak

6. The mass spectrum of 2-chloropropane has a base peak at  $m/z = 43$ . What fragment is responsible for the peak?
- (a) 130 and 101                      (b) 130 and 57  
(c) 130 and 45                        (d) 130 and 115
7. In sigmatropic rearrangement,
- (a) both  $\sigma$  and  $\pi$  bonds migrate  
(b) only  $\sigma$  bond migrates  
(c) only  $\pi$  bonds migrates  
(d) an acyclic compound becomes a cyclic one
8. Photolytic conversion of organic nitrites into nitroso alcohol is known as
- (a) Ritter reaction  
(b) Birch reduction  
(c) Barton reaction  
(d) Paterno – Buchi reaction
9. Inobles undergo electrolytical reduction in the presence of Sn/HCl to give
- (a) Octahydroindole                      (b) 3-nitro indole  
(c) Indigotin                                (d) Indoline



10. \_\_\_\_\_ is found mainly in malt liquors.

- (a) Glucose                      (b) Sucrose  
(c) Lactose                      (d) Maltose

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the  $E_1$  CB mechanism of elimination. What type of substrate undergo this elimination? What are the evidences for this mechanism.

Or

(b) State and explain Saytzeff rule with an example.

12. (a) What do you mean by proton exchange reaction and explain its use?

Or

(b) Write down the principle of  $^1\text{H}$  NMR spectroscopy.

13. (a) Write in detail the general fragmentation modes in mass spectroscopy.

Or

- (b) What do you understand by base peak, isotopic peak and metastable peaks? Describe its importance.

14. (a) State Woodward Hoffmann rules and discuss their applications in pericyclic reactions.

Or

- (b) Define the term photosensitization. Explain the Jablonski diagram with a neat sketch.

15. (a) Describe the structure of Lactose.

Or

- (b) Explain the synthesis and any three important reactions of coumarins.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the mechanism of  $S_N1$ ,  $S_N2$  and  $S_Ni$  reactions with suitable examples.

Or

- (b) (i) Explain the mechanism of cope elimination reactions. What are the factors influencing elimination reactions?
- (ii) Distinguish between elimination and substitution reactions.

17. (a) Define chemical shift. What are the factors that influencing chemical shift? Explain in detail.

Or

- (b) (i) Compare  $C^{13}$  spectroscopy with  $H^1$  NMR spectroscopy.  
(ii) Give a brief account on COSY and INADEQUATE spectra.
18. (a) (i) State and explain Nitrogen rule.  
(ii) Identify the compound with molecular formula  $C_3H_7NO$  which shows.

UV : 238 nm  $\epsilon_{max}$  10500, IR : 3428(m),  
2940 - 2855(W), 1681(S) and  
1452  $cm^{-1}$ (W).

NMR : 1.87  $\tau$  singlet (1 H)<sub>1</sub>, 7.30  $\tau$   
singlet (3H), and 8.1  $\tau$  singlet (3H).

Or

- (b) An organic compound with molecular weight 108 is not acidic in nature but can be easily oxidised to a crystalline compound (m.p : 122° C). It gives the following spectral data : UV :  $\lambda_{max}$  255  $m\mu$   $\epsilon_{max}$  202.

IR : 3402 (s, b), 306 (w), 2288 (m),  
1499 (w, sh) and 1455 NMR : 2.74  $\tau$   
(singlet 24.5 squares), 5.4  $\tau$  (singlet 9.5  
squares)  $cm^{-1}$ (m).



19. (a) Describe the Norrish type-I and Norrish type-II reactions.

Or

- (b) (i) Explain the selection rule for 1,3 sigmatropic shift by thermal and photochemical process.
- (ii) How the stereo specificity in cyclo addition reaction is explained by using FMO approach?
20. (a) Write the synthesis of Oxazole, Imiosazole and Anthocyanins. Explain their important reactions.

Or

- (b) (i) Describe the Pyranose and Furanose forms of aldohexoses and Ketohexoses.
- (ii) Write the biosynthesis of Flavonoids.
-

(8 pages)

Reg. No. : .....

Code No. : 7881

Sub. Code : PCHM 32

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry

INORGANIC CHEMISTRY – III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The correct statement regarding terminal/bridging CO groups in solid  $\text{Co}_4(\text{CO})_{12}$  and  $\text{Ir}_4(\text{CO})_{12}$  is
  - (a) Both have equal number of bridging CO groups
  - (b) Number of bridging CO groups in  $\text{Co}_4(\text{CO})_{12}$  is 4
  - (c) The number of terminal CO groups in  $\text{Co}_4(\text{CO})_{12}$  is 8.
  - (d) The number of bridging CO groups in  $\text{Ir}_4(\text{CO})_{12}$  is 0.

2. The molecule  $(\text{CO})_5\text{M}=\text{C}(\text{OCH}_3)\text{Ph}$  obeys 18-electron rule. Which of the following two 'M' satisfy the condition? (Z: Mo-42, Re-75, V-23, Cr-24)
- (a) Cr,  $\text{Re}^+$                       (b) Mo, V  
(c) V,  $\text{Re}^+$                       (d) Cr, V
3. Reductive elimination step in hydrogenation of alkenes by Wilkinson's catalyst results in (neglecting solvent in coordination sphere of Rh):
- (a) T-shaped  $[\text{RhCl}(\text{PPh}_3)_2]$   
(b) Trigonal-Planar  $[\text{RhCl}(\text{PPh}_3)_2]^+2$   
(c) T-shaped  $[\text{Rh}(\text{H})(\text{PPh}_3)\text{Cl}]^+$ ,  
(d) Trigonal-Planar  $[\text{Rh}(\text{H})\text{Cl}(\text{PPh}_3)_2]$
4. Which among the following catalysts is used in asymmetric catalysis?
- (a) Crabtree's catalyst  
(b) Schrock and Osborn catalyst  
(c) Wilkinson's catalyst  
(d) All of these



5.  $^{31}\text{P}$ - NMR spectrum of meridional isomer of octahedral  $[\text{Ir}(\text{PPh}_3)_3\text{Cl}_3]$  complex will show
- (a) One doublet
  - (b) Two doublets and one triplet
  - (c) Two doublets and two triplets
  - (d) One singlet and one triplet
6. The number of ESR lines expected for the complex  $[\text{Cu}(\text{bpy})_3]^{2+}$  is
- (a) 4
  - (b) 52
  - (c) 90
  - (d) 120
7. Several spectrophotometers have scales in optical density/percent transmittance. What would be transmittance reading at 0.25 optical density?
- (a) 0.6989
  - (b) 0.7500
  - (c) 1.7780
  - (d) None of these
8. In the fluorimetric analysis of  $\text{Mo(VI)}$ , the reagent used is
- (a) rhodamine B
  - (b) calcein
  - (c) thiamin
  - (d) morin

9. Excitation into the charge transfer bands often leads to \_\_\_\_\_ reactions
- (a) photoracemisation
  - (b) photosubstitution
  - (c) photodissociation
  - (d) photoredox
10. The reaction,  $*[\text{Ru}(\text{bpy})_3]^{2+} + \text{Eu}^{3+} \rightarrow [\text{Ru}(\text{bpy})_3]^{3+} + \text{Eu}^{2+}$  is
- (a) oxidative quenching
  - (b) reductive quenching
  - (c) energy transfer
  - (d) self-exchange reaction

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Give the electron counts, oxidation states, and  $d^n$  configurations in the following:
- (i)  $L_3\text{Ru}(\mu - \text{CH}_2)_3\text{RuL}_3$ ,
  - (ii)  $[(\text{CO})_5\text{Cr}(\mu - \text{H})\text{Cr}(\text{CO})_5]^-$ ,
  - (iii)  $\text{WMe}_6$ .

Or

- (b) Discuss the bonding of metal-carbonyls:

12. (a) Explain nucleophilic and electrophilic attack on coordinated ligands:-

Or

- (b) If methanol/HI is carbonylated in a system resembling the Monsanto acetic acid process, but with  $[(dpe)RhI(CO)]$  as catalyst and  $H_2$  present, ethanol is formed from methanol. Provide two reasonable mechanisms and suggest an experimental test to distinguish between them.
13. (a)  $^{11}B$  NMR spectrum of  $NaB_3H_8$  consists of nonet and its proton nmr is decet. Account for this. (5)

Or

- (b) EPR spectrum of  $[CuSiF_6] \cdot 6H_2O$  has single band with isotropic  $g'$  value at room temperature but at 20 K it has three lines with anisotropic  $g$  values. Explain.
14. (a) Explain how  $Fe^{3+}$  and  $Co^{3+}$  can be estimated spectrophotometrically.

Or

- (b) Compare and contrast the properties and analytical applications of differential thermal and thermogravimetric analytical methods (DTA and TGA).



15. (a) Give Adamson's rule. The product of photoaquation of  $[\text{Cr}(\text{NH}_3)_5\text{Cl}]^{2+}$  is  $\text{cis-}[\text{Cr}(\text{NH}_3)_4(\text{OH}_2)\text{Cl}]^{2+}$ . Discuss.

Or

- (b) Give different types of excited states and explain various reactions taking place from them.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Draw Ligand Group Orbitals (LGO) and matching atomic orbitals on cobalt for cobaltocene and construct molecular orbital diagram. Using MO diagram discuss the occupancy and nature of the HOMO in  $[\text{Co}(\eta^5\text{-Cp})_2]^-$  and the change in metal ligand bonding relative to neutral cobaltocene.

Or

- (b) Discuss the structure and bonding in the following metal carbonyls: (i)  $\text{Fe}_3(\text{CO})_{12}$  (ii)  $\text{Co}_2(\text{CO})_8$  (iii)  $\text{Fe}_2(\text{CO})_9$  and (iv)  $\text{Mn}_2(\text{CO})_{10}$ .

17. (a) Discuss the carbonylation of methanol, when it is dry and when it has 5% water.

Or

- (b) Write short notes on (i) water gas shift reaction (ii) Zeigler-Natta catalysis.
18. (a) (i) 56.4 MHz Fluorine-19 NMR spectra of  $\text{SeF}_4$  ( $A_2X_2$  pattern) at  $-140^\circ\text{C}$  contain two triplets, with  $\delta_A = 37.7$  ppm and  $\delta_X = 12.1$  ppm,  $J_{AX} = 26$  Hz, flanked either side by two weak triplets and a single peak at  $+20^\circ\text{C}$  without any weak peaks on either side. From your knowledge of structure of compounds like  $\text{SF}_4$  interpret the NMR spectra. Is Berry pseudo rotation observed in the molecule at  $+20^\circ\text{C}$ ? ( $^{77}\text{Se}$ :  $I = 1/2$ , 7.5% abundant)
- (ii) NMR of paramagnetic molecules is difficult to study. Substantiate the statement with examples.

Or

- (b) Discuss the EPR spectra of (i)  $[\text{Fe}(\text{CN})_5\text{NO}]$ , (ii)  $[\text{VO}(\text{H}_2\text{O})_6]^{2+}$ , (iii)  $\text{K}_2[\text{IrCl}_6]$  and (iv)  $\text{Co}_3(\text{CO})_9\text{Se}$ .

19. (a) (i) Discuss inductively coupled Argon plasma source used in atomic absorption spectroscopy.
- (ii) Describe spectral and chemical interference in atomic absorption spectroscopic analysis.

Or

- (b) (i) Discuss the principles and applications of atomic fluorescence spectroscopy.
- (ii) What is the purpose of an internal standard in flame emission methods?
- (iii) Why is spectrofluorometry more sensitive than spectrophotometry?
20. (a) Discuss the applications of semiconductor based photoelectrochemical cells in the storage of solar energy.

Or

- (b) Write in detail about the photophysical and photochemical properties of  $[\text{Ru}(\text{bpy})_3]^{2+}$ .
-



(6 pages)

Reg. No. : .....

Code No. : 7882

Sub. Code : PCHM 33

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry — Core

PHYSICAL CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Point group of molecule with only reflection symmetry is  
(a)  $\sigma_v$  (b)  $C_0$   
(c)  $C_i$  (d)  $C_1$
- Total number of irreducible representations in ammonia is  
(a) 3 (b) 6  
(c) 4 (d) 2

3. In reduction formula 'h' refers to  
(a) plank's constant (b) class  
(c) order (d) none
4. Based on HMO theory,  $H_{14}$  is  
(a) 1 (b)  $\alpha$   
(c) 0 (d)  $\beta$
5. Solvent used in NMR is  
(a) DMSO (b)  $\text{CHCl}_3$   
(c)  $\text{CDCl}_3$  (d) All
6. FID means  
(a) Fourier Interaction Decay  
(b) Frequency Induction Decay  
(c) Fourier Induction Decay  
(d) Fourier Inversion Decay
7. ESR is mainly depends on  
(a) J value  
(b) anisotropy  
(c) g-value  
(d) double resonance

8. Which one is related to NQR spectra?
- (a) SPI (b) NOE  
(c) Anisotropy (d) Asymmetry
9. Which of the following is used in Electronic spectra?
- (a) Kramer's degeneracy  
(b) Isomer shift  
(c) Magnetic hyper fine interaction  
(d) Franck-Condon principle
10. Which of the following is not related to mass spectra?
- (a) Doppler shift (b) Fragmentation  
(c) Anisotropy (d) Asymmetry

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) List the symmetry elements and point group for the following molecules (i) Ferrocene (ii) XeF<sub>4</sub>.

Or

- (b) Write the rules of irreducible representations.



12. (a) Deduce the vibrational modes of water molecule.

Or

- (b) Determine the delocalization energy of trans-1, 3-butadiene.

13. (a) How chemical shift vary with solvent, concentration of the compound and temperature?

Or

- (b) Compare the principles of  $^{13}\text{C}$  and  $^{31}\text{P}$  NMR spectra.

14. (a) Differentiate NMR and EPR spectra.

Or

- (b) Write the selection rules and energy levels of NQR spectroscopy.

15. (a) Write the applications of Born-Oppenheimer approximation and Frank-Condon principle in electronic spectroscopy.

Or

- (b) How isotopes affects the appearance of mass spectrum?

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) How will you determine point group for a molecule?

Or

- (b) Construct the character table for  $C_{4V}$  point group.

17. (a) Determine the hybrid atomic orbitals in  $PF_5$  molecule.

Or

- (b) Construct projection operators and molecular orbitals by SALC.

18. (a) How will you characterise your sample by  $^1H$ NMR spectroscopy?

Or

- (b) Discuss the role of NMR spectroscopy in MRI.

19. (a) Discuss zerofield splitting and Kramer's degeneracy.

Or

- (b) Write the quadrupole transitions in axially symmetric fields.
20. (a) Write the role of Fortrat diagram in Electronic Spectroscopy.

Or

- (b) How will you determine molecular weight of a compound by mass spectrum?
-



(7 pages)

Reg. No. : .....

Code No. : 7883

Sub. Code : PCHM 34

M.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2019.

Third Semester

Chemistry – Core

SCIENTIFIC - RESEARCH METHODOLOGY

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer:

1. Which of the following are top tips we offer to help you improve your use of the literature?
  - (a) Keep a research notebook
  - (b) Sort your references in a spreadsheet
  - (c) Apply Fisher's notation to the arguments you encounter
  - (d) All of the above

2. Which of these describes our advice on using internet search engines?
- (a) Engines such as Yahoo and Google are much more efficient and effective than databases such as PsycINFO
  - (b) Web addresses ending in .ac.uk, or .edu are generally bonafide academic sources
  - (c) Wiki entries are more up to date and accurate than journal articles
  - (d) None of the above
3. The \_\_\_\_\_ is an indispensable aid when searching the chemical substance and the General Subject Volume Indexes.
- (a) Decennial index
  - (b) Patent index
  - (c) Service source index
  - (d) Index Guide
4. Subject term referring to reactions, processes and equipment, classes of substances, and plant and animal species should be searched in the \_\_\_\_\_
- (a) Service source index
  - (b) General Subject Index
  - (c) Decennial index
  - (d) Patent index

5. A hypothesis must be \_\_\_\_\_.
- (a) Diffuse                      (b) Specific  
(c) Slow                          (d) Speedy
6. \_\_\_\_\_ is the first step of research process.
- (a) Formulation of a problem  
(b) Collection of Data  
(c) Editing and Coding  
(d) Selection of a problem.
7. Which of the following region of infrared is extremely useful for spectroscopic studies of organic compounds?
- (a) Near Infrared  
(b) Far infrared  
(c) Middle infrared  
(d) None of these
8. If the instrument is used in wrong manner while application, then it will results in \_\_\_\_\_.
- (a) Systematic error  
(b) Instrument error  
(c) Random error  
(d) Environmental error



9. \_\_\_\_\_ is a website which provides subscription-based access to a large database of scientific and medical research.
- (a) SciFinder                      (b) Chemport  
(c) Science Direct                (d) Elsevier
10. One of the following search engine is exclusively meant for scientific information \_\_\_\_\_.
- (a) Google                          (b) SCIRUS  
(c) Yahoo                            (d) Altavista.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write a note on current contents.

Or

- (b) Write a note on science citation index.

12. (a) Describe about the Chemical abstracts.

Or

- (b) Describe the collective index and service source index.

13. (a) How will you organize the manuscript?

Or

(b) What is an abstract of a research paper?  
Narrate the informative abstract.

14. (a) Write a note on significant figures.

Or

(b) What is student's t-distribution and t-tests?

15. (a) Write any five browsers for your literature survey in the internet.

Or

(b) Write the role of STN international in scientific and technical research.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the sources of chemical information.

Or

(b) Write a note on Indexes and abstracts in science and technology.

17. (a) Explain the following
- (i) General Subject Index
  - (ii) Chemical Substance Index.

Or

- (b) State the following
- (i) Formula Index
  - (ii) Index of Ring Systems.
  - (iii) Author index
  - (iv) Patent.

18. (a) How will you write a research report?

Or

- (b) What are the characteristics of a good research problem?

19. (a) Explain the principle and sample preparation of TEM.

Or

- (b) What is an error? How will you classify the errors?



20. (a) How will you prepare research proposal for any grants?

Or

(b) How will you submit your research paper through online to various journals?

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(6 pages)

Reg. No. : .....

Code No. : 7160

Sub. Code : PCHE 21

M.Sc. (CBCS) DEGREE EXAMINATION,  
APRIL 2019.

Second Semester

Chemistry – Elective

ADVANCED TOPICS IN CHEMISTRY - II

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In chemsketch \_\_\_\_\_ mean press and hold down the left mouse button while you move the mouse
- (a) click
  - (b) double-click
  - (c) drag
  - (d) right-click

2. In chemdraw optional toolbars are divided into \_\_\_\_\_ basic groups
- (a) 2
  - (b) 3
  - (c) 4
  - (d) 5
3. The electrical conductivity of the nanocomposites embedded with insulating nanoparticles \_\_\_\_\_
- (a) decreases rapidly
  - (b) increases rapidly
  - (c) decreases slowly
  - (d) increases slowly
4. In nanocomposites the matrix phase is in the form of \_\_\_\_\_
- (a) fibers
  - (b) sheets
  - (c) particles
  - (d) none of the above
5. Polymer crystallinity is strongly affected by the \_\_\_\_\_ of substituent groups on the chains
- (a) nature
  - (b) steric requirements
  - (c) position
  - (d) type



6. Thermoplastics have a \_\_\_\_\_ Tg and are therefore \_\_\_\_\_ at room temperature
- (a) low, soft            (b) high, hard  
(c) high, soft            (d) low, hard
7. Diseases \_\_\_\_\_ are commonly transmitted by direct oral contact
- (a) Herpes simplex virus and mononucleosis  
(b) Polio and rotavirus  
(c) Herpes simplex virus and polio  
(d) Mononucleosis and polio
8. Diseases that can be transmitted by direct contact are called \_\_\_\_\_
- (a) infectious            (b) contagious  
(c) contagious            (d) infections
9. The enzyme amylase, found in the human digestive tract, catalyzes only the hydrolysis of starch to yield \_\_\_\_\_
- (a) fructose            (b) cellulose  
(c) glucose            (d) sucrose
10. A cofactor can be either an inorganic ion or a small organic molecule called a \_\_\_\_\_
- (a) apoenzyme            (b) holoenzyme  
(c) coenzyme            (d) hypoenzyme

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write a brief account of cartridge analysis.
- Or
- (b) Write notes on chem sketch.
12. (a) Describe briefly on polystyrene / clay nano composites.
- Or
- (b) Write a note on polyamide / clay nano composites.
13. (a) Narrate the structure of acrylonitrile butadiene styrene.
- Or
- (b) Describe the applications of polyphenylene sulphide.
14. (a) Write a brief account of chemical and process development of drugs.
- Or
- (b) Write an account of toxicology.



15. (a) Describe the characteristics of enzymes.

Or

(b) Write short notes on citric acid cycle.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Give brief account on world wide used and chemical databases on internet.

Or

(b) Write notes on:

(i) Forensic serology

(ii) Drug analysis

17. (a) Write in detail the properties and applications of bio-nanocomposites.

Or

(b) (i) Discuss the applications of nanomaterials in catalysis.

(ii) Explain the synthesis of nylon 6-clay hybrid.

18. (a) Describe the synthetic route, structure and applications of poly ethylene terephthalate.

Or

(b) Discuss the synthesis and applications of ion exchange resins.

19. (a) Write notes on:

(i) Bio assays and leads

(ii) Hansch analysis

Or

(b) Discuss the following:

(i) Quantitative structure activity relationships.

(ii) Patent protection.

20. (a) Give an account of the following:

(i) Biological energy

(ii) Biological oxidation.

Or

(b) (i) Write an account of calixarenes as enzyme model.

(ii) Write briefly on lipid metabolism.



(7 pages)

Reg. No. : .....

Code No. : 7157

Sub. Code : PCHM 21

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

Second Semester

Chemistry – Core

ORGANIC CHEMISTRY – II

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

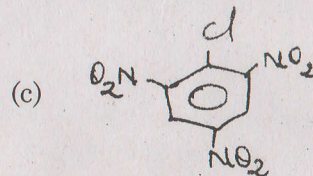
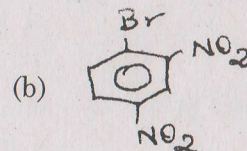
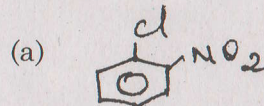
1. The spectra of condensed ring systems are useful as \_\_\_\_\_.

- (a) reference
- (b) finger print
- (c) model
- (d) both reference and model

2. Mesityl oxide absorbs at \_\_\_\_\_ nm.

- (a) 299
- (b) 289
- (c) 279
- (d) 239

3. Which among the following compound will give  $\text{ArS}_M 2$  reaction



(d) all of these

4.  $\text{ArS}_N 1$  reaction is mainly given by \_\_\_\_\_.

- (a) alkyl diazonium cation
- (b) aryl diazonium cation
- (c) alkyl anion
- (d) aryl anion



5. Carbenes are highly reactive intermediates possessing a \_\_\_\_\_.

- (a) mono coordinate carbon atom
- (b) dicoordinate carbon atom
- (c) tricoordinate carbon atom
- (d) tetracoordinate carbon atom

6. Triplet carbene is a bent molecule with an angle of about

- (a)  $103^\circ$
- (b)  $136^\circ$
- (c)  $120^\circ$
- (d)  $190^\circ 28'$

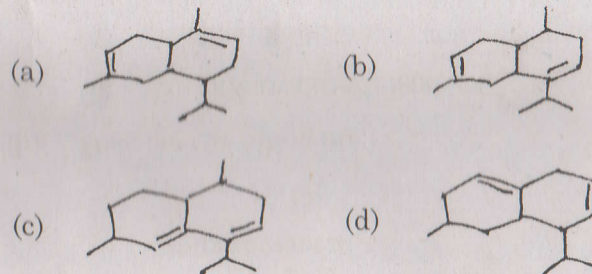
7. Quinine is a

- (a) Opium alkaloid
- (b) Cinchona alkaloid
- (c) Coca alkaloid
- (d) Solanaceous alkaloid

8. Hydrolysis of cephalosporin C with acid gave

- (a) one molecule of  $\text{CO}_2$
- (b) one molecule of D -  $\alpha$  - amino adipic acid
- (c) two molecules of  $\text{NH}_3$
- (d) all of above

9. Identify  $\alpha$  - Cadinene from the following



10. Vitamin E is also called

- (a) Phylloquinone
- (b) Tocopherol
- (c) Cyanocobalamin
- (d) Nicotinic acid

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) How will you distinguish ortho nitrophenol from para nitrophenol by infra-red studies?

Or

(b) Discuss the effect of solvent polarity on  $n \rightarrow \pi^*$  and  $\pi \rightarrow \pi^*$  transitions of  $\alpha, \beta$  -unsaturated carbonyl compounds.



12. (a) Give an account of the synthetic applications of Wittig reaction.

Or

- (b) Write a brief account on benzyne mechanism.
13. (a) Discuss the synthetic applications of Wolff rearrangement of acyl carbenes.

Or

- (b) Explain the structure and stability of aryne.
14. (a) Describe a synthesis of (-) chloramphenicol.

Or

- (b) Briefly discuss the biosynthesis of tyrosine.
15. (a) Outline the synthesis of  $\alpha$ -Santonin.

Or

- (b) How will you synthesize the following
- (i) Vitamin-C
- (ii) Squalene.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Discuss the effect of steric hindrance to coplanarity with respect to UV-vis absorption.
- (ii) Describe the IR absorption of carbonyl group in p-nitro acetophenone and p-methyl acetophenone.

Or

- (b) (i) Predict the sign of the Cotton effect for Cholestan-3-one based on octant rule
- (ii) Write an explanatory note on ORD curves.

17. (a) (i) Write any four applications of  $\text{NaBH}_4$ .
- (ii) Write an account of Smiles rearrangement.

Or

- (b) Discuss the following :
- (i) Dieckmann condensation
- (ii) Michael addition.