

20. Write notes on the following :

(5 + 5 + 5)

- (a) Collision number
- (b) Mean free path
- (c) Brownian movement.

1264/UCHE01

NOVEMBER 2016

**INORGANIC, ORGANIC AND PHYSICAL
CHEMISTRY – I**

Time : Three hours

Maximum : 100 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. State Huckel's rules.
2. Write the structure of DDT and Feron.
3. Give the properties and uses of picric acid.
4. What are ylides? Give an example.
5. Give one method for preparing and two uses of ozone.
6. Suggest one method for softening water.
7. Write Dieterici's reduced equation of state.
8. Define : Critical temperature and critical volume.
9. How does temperature influence viscosity?
10. Give any four uses of liquid crystals.

SECTION B — (5 × 7 = 35 marks)

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

11. (a) Write notes on resonance effect and hyperconjugation.

Or

(b) Distinguish : nuclear and side chain halogen compounds.

12. (a) Give one method of producing, two chemical properties and three uses of glycerol.

Or

(b) Provide an account of polynuclear hydrocarbons.

13. (a) Provide details on magnetic separation and gravity separation involved in metal extraction.

Or

(b) Explain the diagonal relationship of Li with Mg.

14. (a) Represent PV – isotherms of real and van der Waal's gases.

Or

(b) Derive the relationship between Boyle's and inversion temperature of gases.

15. (a) Write notes on : nature of cohesive forces in liquids.

Or

(b) Give an account on the types and uses of liquid crystals.

SECTION C — (3 × 15 = 45 marks)

Answer any THREE questions.

16. Discuss the structure, stability and aromatic character of benzene.

17. Write note on the following (3 + 3 + 3 + 6)

(a) Saccharin

(b) Chloramine – T

(c) Mustard gas

(d) Polynuclear compounds.

18. Explain the following : (5 + 5 + 5)

(a) Van arkel process

(b) Aluminothemic process

(c) Zone refining.

19. Describe the determination of critical constants.

1265/UCHE02

NOVEMBER 2016

INORGANIC, ORGANIC AND PHYSICAL
CHEMISTRY – II

Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is the first aid to be given for burns due to bromine and phenol?
2. Give the difference between acetophenone and benzophenone.
3. What is bond order? Give examples.
4. What is Heisenberg's uncertainty principle?
5. Write the differences between crystalline and amorphous solids.
6. What are semiconductors? Give examples.
7. What is n/p ratio? What is its significance?

8. What is magic number?
9. Draw the complete phase diagram for the water system.
10. Define : Efflorescence and deliquescence.

PART B — (5 × 7 = 35 marks)

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

11. (a) Write the tests to distinguish aldehydes from ketones.

Or

- (b) Give the mechanism of benzoin condensation.

12. (a) Give the method of extraction of platinum.

Or

- (b) Describe Born-Haber cycle:

13. (a) Describe the extraction of tungsten.

Or

- (b) Write notes on crystal defects.

14. (a) Define the terms: dipole moment, isotopes, isobar and isotones.

Or

- (b) Discuss the types of radioactive decay.

15. (a) Draw and discuss the phase diagrams for Lead-Silver system.

Or

- (b) State Distribution Law. Under what conditions the Distribution Law is valid.

PART C — (3 × 15 = 45 marks)

Answer any THREE questions.

16. (a) Give the principle column chromatography. (7)
- (b) Write notes on Mannich reaction and vanillin. (4 + 4)

17. (a) Discuss the various types of hydrogen bonding. (9)

- (b) Write notes on basic iodine. (6)

18. (a) Explain the method of manufacture of ammonia. (10)

- (b) Write the uses of uranium and vanadium. (5)

19. Describe the applications of radioactive isotopes.

20. Explain phenol-water system (the system with upper C.S.T) and copper sulphate-water system with neat diagrams. (8 + 7)

APPLIED CHEMISTRY

Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What are the standards prescribed by WHO for total hardness, TDS and E. Coli count for potable water?
2. Write a note on phenoyls.
3. What are repellants? Give examples.
4. List some of the fertilizer industries established in India.
5. What are the various raw materials used for the preparation of pulp for the manufacture of paper?
6. What do you mean by sizing?
7. Name a few sugar industries in India.

8. How rectified spirit can be obtained from beer?
9. What are antimalarials? Give examples.

10. Draw the structure of penicillin.

PART B — (5 × 7 = 35 marks)

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

11. (a) Write notes on Reverse Osmosis (RO) method of desalting sea water.

Or

- (b) How is face powder produced?

12. (a) Write notes on nitrogenous fertilizers.

Or

- (b) Describe the composition of petroleum.

13. (a) Discuss the process of manufacture of pulp.

Or

- (b) What are calendering and beating processes involved in the pulp manufacture?

14. (a) How is sugar tested and estimated?

Or

- (b) Describe the preparation of absolute alcohol from rectified spirit.

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15. (a) What are sulpha drugs? Explain in detail with examples.

Or

- (b) Discuss the structure activity relationship of tetracyclines.

PART C — (3 × 15 = 45 marks)

Answer any THREE questions.

16. Provide an explanatory review on the methods of municipal water treatment.

17. Discuss various types of organic and inorganic pesticides.

18. Describe the various processes involved in the manufacture of paper.

19. (a) Explain the preparation of alcohol from molasses. (8)

- (b) Give the manufacture of wine. (7)

20. Provide comprehensive notes on anaesthetics.

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INORGANIC CHEMISTRY

Time : Three hours

Maximum : 100 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Draw the structure of cyanogen and give its uses.
2. How fluorine distinguishes from other halogens?
3. What are the important ores and oxidation states of molybdenum?
4. Mention the important alloys of vanadium and their uses.
5. State EAN rule.
6. Give the IUPAC name of $K_4[Fe(CN)_6]$ and $PtCl_2(NH_3)_2$.
7. Write any two reactions in liquid ammonia.
8. What is Fajan's rule?
9. Bring out the differences between accuracy and precision.
10. Draw the structure of EDTA.

SECTION B — (5 × 7 = 35 marks)

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

11. (a) Give a brief account on carbides.
Or
(b) Explain the manufacture of bleaching powder by Bachmann's process.

12. (a) Write a note on the oxides of titanium and its alloys.
Or

- (b) Explain the role of metal ions in biological systems.

13. (a) Mention the salient features of crystal field theory.
Or

- (b) Discuss the optical isomerism in octahedral complex compounds.

14. (a) Describe Born - Haber cycle with a neat diagram.
Or

- (b) State the Bronsted - Lowry and Lewis concept on acids and bases.

15. (a) What are the kinds of determinate errors?

Or

- (b) Describe the types of precipitates.

SECTION C — (3 × 15 = 45 marks)

Answer any THREE questions.

16. Discuss the preparation, properties and uses of carbon disulphide.

17. What are the ores of vanadium? Discuss the metallurgy of vanadium from any of the ores.

18. Discuss the geometrical isomerism in octahedral complex compounds.

19. Describe the following : (5 + 5 + 5)

(a) Inter - molecular hydrogen bonding

(b) Levelling effect

(c) Dipole - dipole interactions in liquids.

20. Write notes on the following : (5 + 5 + 5)

(a) Significant figures

(b) Specific and selective precipitants

(c) Post - precipitation.

BSc CHEMISTRY DEGREE EXAMINATIONS – III year

SUBJECT NAME: ORGANIC CHEMISTRY

SUBJECT CODE: UCHE05

MAX. MARKS: 100

TIME: 3 HOURS

PART – A Answer all (10 X 2 = 20 MARKS)

1. What are stereo isomers?
2. What is racemization?
3. Expand and draw the structure of DDT
4. What is picric acid? Write its test of confirmation.
5. Compare the structures of thiophene and pyrrole
6. Write any two physical properties of isoquinoline
7. How citral is converted to geraniol?
8. What is glycosidic linkage? Give an example
9. What is Woodward – Fieser rule?
10. State Stark – Einstein law.

PART – B Answer all questions –either (a) or (b) (5X7 = 35 MARKS)

11a. Discuss the optical isomerism of tartaric acid (or)

11b. Explain briefly on the stereochemistry on the addition of Br₂ to cis – and trans – 2 – butane.

12a. Give the structural elucidation of naphthalene (or)

12b. Write a detailed note on the structure, preparation and applications of alizarin

13a Write the mechanism of Skraup synthesis (or)

13b How pyridine is prepared from (a) acetylene (b) pentamethylenediamine

14a. Elucidate the structure of fructose (or)

14b Draw and explain the structures of alpha – and beta – D fructopyranoses

15a. Write a short notes on the following:

(i) Finger print region [3] Chromophores and auxochromes with examples [4] (or)

15b. Discuss the role of enzymes and bioenzymes in various biological processes.

PART – C Answer any three (3X15 = 45 MARKS)

16. (i) Describe briefly on the geometrical isomerism of aldoximes and ketoximes (8)

(ii) Explain stereo – specific and stereo – selective addition reactions (7)

17. How are the following compounds prepared? [3+3+3+3+3+]

a) Phenylacetic acid b) Isophthalic acid c) Cinnamic acid

d) Mandelic acid e) Salicylic acid

18. a) Write a notes on the structure and resonance of quinoline [4]

b) Write the following reactions:

(i) Friedal – craft reaction of thiophene [4] (ii) Furan with diazonium compounds [4]

(iii) Mercurration of pyrrole [3]

19. a) What is a hormone [2]

b) How are the sex hormones classified? Write any two significant functions of each hormone [6]

c) Synthesize oestrone from 6 – methoxy tetralone [7]

20. How NMR spectrum for the following compounds is interpreted?

a) i) $\text{CH}_3\text{CH}_2\text{OH}$ ii) CH_3CHO iii) CH_3COCH_3 [9]

b) Classify and explain the equivalent and non – equivalent protons [3]

c) What are the factors which affect the chemical shift in NMR spectroscopy? [3]

PART – A Answer all (10 X 2 = 20 MARKS)

1. What is the difference between order and molecularity of a chemical reaction?
2. Write the expression for $t_{1/2}$ of first order reaction.
3. State Beer-Lambert's Law.
4. What is meant by photosensitization in photochemistry?
5. Write the expression relating Helmholtz free energy (A) and Gibbs free energy (G).
6. What are the criteria for reversible and irreversible processes in terms of entropy changes?
7. Why reference electrode is required?
8. Write Nernst equation.
9. What are the different regions of electromagnetic radiations?
10. Write the selection rules for rotational spectra.

PART – B Answer all questions –either (a) or (b) (5X7 = 35 MARKS)

- 11a. Derive the rate equation for the first order reaction (or)
- 11b. Elaborate on bimolecular collision theory.
- 12a. State the laws of photochemistry. (or)
- 12b. Explain the photochemical kinetics of the formation of HCl.
- 13a. Derive the relationship between T, V & P of an ideal gas undergoing adiabatic reversible expansion. (or)
- 13b. Discuss Carnot's theorem and Carnot's cycle.
- 14a. What is cell diagram? What are the terminologies and conventions adopted regarding signs of cell emf? (or)
- 14b. Give a comprehensive note on concentration cells.
- 15a. Explain the vibrational spectra of H₂O. (or)
- 15b. Compare: IR and Raman spectroscopic techniques.

PART – C Answer any three (3X15 = 45 MARKS)

16a. Explain the kinetics of the decomposition of N_2O_5 and acid hydrolysis of ester. [7+8]

17. Explain the following: [7+8]

(a) Phosphorescence (b) Jablonski diagram

18. Discuss the following: [5+5+5]

(a) the relationship between C_p & C_v (b) Joule-Thomson effect (c) Inversion temperature

19(a). Explain electrochemical series and its applications. [8]

19(b). Describe the construction of Saturated calomel electrode. [7]

20. Give short notes on the following [5+5+5]

(a) Franck-Condon principle (b) Applications of Raman spectroscopy (c) Vibrational energy level diagram.

**MECHANICS, PROPERTIES OF MATTER, SOUND
AND THERMAL PHYSICS**

Time : Three hours

Maximum : 100 marks

SECTION A — (10 × 3 = 30 marks)

Answer any TEN out of Twelve questions.

1. What are central forces?
2. Define Torque.
3. What are artificial satellites?
4. Define Poisson's ratio.
5. What is meant by Simple harmonic motion?
6. What are beats?
7. Define specific heat capacity at constant volume.
8. Define Lapse rate.
9. What is meant by green house effect?
10. State Planck's law.
11. Define mean free path.
12. Define the efficiency of a heat engine.

SECTION B — (5 × 6 = 30 marks)

Answer any FIVE out of Eight questions.

13. Obtain the expression for the work done by a force and a varying force.
14. Write a note on work and power in rotational motion.
15. State and explain Kepler's laws of planetary motion.
16. In an experiment a rod of diameter of 0.1012 m was supported on two knife edges, placed 0.8 meter apart. On applying a load of 1.9 kg exactly midway between the knife edges, the depression on the middle point was observed to be 0.0055m. Calculate the young's modulus of the substance.
17. Obtain the expression for the couple per unit twist.
18. List the properties of progressive waves.
19. List the uses of solids of low expansivity.
20. Calculate the surface temperature of sun.

SECTION C — (4 × 10 = 40 marks)

Answer any FOUR out of Six questions.

21. Estimate the mass of the Sun, assuming the orbit of the earth round the Sun to be a circle. The distance between the Sun and the earth is 1.49×10^{11} m and $G = 6.66 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$.
22. Explain Boy's method for determining G.
23. State and explain Bernoulli's theorem.
24. Obtain the expression for the resultant SHM of two SHMs at right angles.
25. Describe Lee's disc method for determining the conductivity of a bad conductor.
26. Give a detailed account on experimental verification of Maxwell's law of distribution of molecular speed.

**ELECTRICITY, ELECTRONICS, OPTICS
SPECTROSCOPY AND MODERN PHYSICS**

Time : Three hours

Maximum : 100 marks

SECTION A — (10 × 3 = 30 marks)

Answer any TEN out of Twelve questions.

1. Define capacity of a conductor. What is its unit?
2. Define sensitivity of Wheatstone's bridge.
3. What is meant by wattles current?
4. What is the use of a Π section filter?
5. What is meant by logic circuits?
6. Define Chromatic aberration.
7. What is meant by a secondary rainbow?
8. Give the condition of constructive interference of light.
9. What is meant by double refraction?

10. What is an optical fibre?

11. Give the wave length region of infrared region.

12. What is meant by time dilation?

SECTION B — (5 × 6 = 30 marks)

Answer any FIVE out of Eight questions.

13. Define electric potential and electric field. What is the relation between them?

14. State and explain Kirchoff's laws.

15. Obtain the expression for the emf generated in a coil rotating in a uniform magnetic field.

16. Explain the working of a zener diode.

17. State and explain De Morgan's theorem.

18. Newton's rings are observed in reflected light of $\lambda = 5.9 \times 10^{-5}$ cm. The diameter of the 10th dark ring is 0.5 cm. Find the radius of curvature of the lens and the thickness of the air film.

19. Describe the working of a photo voltaic cell.

20. Write a note on length contraction.

SECTION C — (4 × 10 = 40 marks)

Answer any FOUR out of Six questions.

21. State and prove Gauss law. Obtain the expression for the field due to a charged sphere.

22. Give the theory of Ballistic galvanometer.

23. Explain the working of a Hartley oscillator.

24. Convert

(a) 111001100.10101 into decimal

(b) 98765.4321 into binary

(c) Add 11111.11 and 1111.111

(d) Subtract 11111.111 from 101000000.0001.

25. Write a note on the principle and use of Jamin's interferometer.

26. How specific rotatory power of a liquid is determined with Laurent's half shade polarimeter?