

**F-6355**

**Sub. Code**

**7MCH1C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Chemistry**

**ORGANIC CHEMISTRY – I**

**(CBCS – 2017 onwards)**

Time : 3 Hours

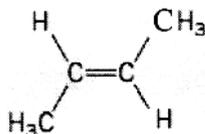
Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define: inductive effect. Arrange CN, F, Br, Cl, COOH, I in the decreasing order of (-I) effect.
2. Write Taft equation. Give its significance.
3. Which among neopentane, isopentane, 3-methylpentane and 3-methylhexane can exhibit optical activity? Why?
4. Assign E or Z configuration to the given compound.



5. Define “Aromaticity”
6. State “Craig’s rule”
7. Write any two methods of free radical formation.

8. Explain why tertiary carbocation is more stable than primary carbocation.
9. What is nucleophilicity?
10. What is  $\beta$ -elimination?

**Part B**

(5 × 5 = 25)

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

11. (a) What is resonance? Explain how it contributes the stability of the organic compound.

Or

- (b) (i) Which is more reactive among the ethyl chloride, isopropyl chloride and tertiary butyl chloride in nucleophilic substitution reactions? Why?

- (ii) Which among the ammonia  $R-NH_2$ ,  $R_2-NH$  and  $R_3-N$  is more basic? Why?

12. (a) Explain the conditions for the optical activity of biphenyls. Provide examples.

Or

- (b) Draw the sawhorse and newmann projections of 2-enantiomers of 2-butanol.

13. (a) State Huckel's rule and conditions of a molecule to be aromatic.

Or

- (b) Discuss the aromatic nature of annulenes with examples.

14. (a) Write the formation and reactions of carbene.

Or

- (b) State and Explain "Hammond's Postulate".

15. (a) Explain the mechanism of  $E_1$  mechanism. Provide the factors affecting it

Or

- (b) Discuss the  $E_1CB$  mechanism with examples.

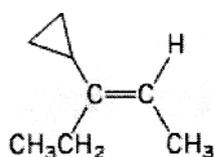
**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write the Hammett equation. Give its limitations, modifications, deviations and applications in reaction mechanism.

17. (a) Write the E or Z configuration of



- (b) Draw the stereoisomers of 2,3-butanediols.
- (c) Define and Give examples for diastereotopic atoms/groups. (4+3+3)
18. (a) Using Huckel theory, say the aromatic nature of cyclopropane, cyclopropenyl cation, cyclopentadienyl cation and cyclopentadienyl anion.
- (b) Explain the aromatic nature of fulvenes and azulenes. (5+5)
19. Discuss the preparations, stability and reactions of carbanion.
20. Explain the  $SN_1$  and  $SN_2$  mechanisms with examples.

**F-6356**

**Sub. Code**

**7MCH1C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Chemistry**

**INORGANIC CHEMISTRY – I**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Why is Van der Waals radius greater than covalent radius?
2. Write the Born-Landé equation and explain the terms involved in it.
3. Anti-bonding molecular orbitals have higher energy than that of bonding molecular orbitals. Explain.
4. Predict the shape of SF<sub>4</sub> on the basis of VSEPR theory.
5. Define Bronsted-Lowry concept of acids and bases.
6. Write down the autoionization reaction of anhydrous sulphuric acid.
7. How is borazine prepared? What happens when it is hydrolysed at higher temperature?
8. Write the preparation of P<sub>4</sub>S<sub>9</sub>.

9. What is meant by intrinsic semiconductor? What happens when it is heated?
10. What are main crystal defects?

**Part B** (5 × 5 = 25)

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

11. (a) What is effective nuclear charge? How do we calculate the ENC?

Or

- (b) Use the following data to calculate the enthalpy of formation of strontium chloride. You must write all thermochemical equations for the steps of the cycle. The enthalpy of sublimation of strontium = + 164 kJ/mole First ionization energy for strontium + 549 kJ/mole Second ionization energy for strontium = + 1064 kJ/mole. The enthalpy of dissociation of chlorine,  $\text{Cl}_2 = + 243$  kJ/mole. The electron affinity of chlorine,  $\text{Cl} = - 349$  kJ/mole Lattice energy of strontium chloride = - 2150 kJ/mole.

12. (a) Derive the wave function of SP hybrid orbitals.

Or

- (b) Distinguish between VBT and MOT.

13. (a) What is common ion effect? Discuss its applications.

Or

- (b) Explain the classification of solvents with suitable examples.

14. (a) Discuss the chemistry of  $\text{P}_4\text{S}_3$ .

Or

- (b) What is silicon nitride? How is it prepared? Mention its applications.

15. (a) How are semiconductors used in solar energy conversion?

Or

- (b) Describe the free electron theory of solids.

**Part C** (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the different types of electrostatic interactions  
(b) Explain the percentage of ionic character of covalent compounds (5+5)
17. Discuss the MO diagram of BeH<sub>2</sub> molecule
18. (a) Explain HSAB principle. How do they apply to explain the stability of complexes and feasibility of reaction  
(b) Discuss any five reactions that occur in liquid HCN. (6+4)
19. (a) Discuss the chemistry of S<sub>4</sub>N<sub>4</sub>  
(b) Mention the preparation, properties and structure of polymeric sulphur nitride (4+6)
20. Write short notes on (a) high temperature superconductors (b) non stoichiometric crystal defects (5+5)

**F-6357**

**Sub. Code**

**7MCH1C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Chemistry**

**PHYSICAL CHEMISTRY – I**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Calculate the mean activity coefficient of a 0.001 M solution of  $\text{MgSO}_4$  in water at  $25^\circ\text{C}$ .
2. What do you mean by hydrogen over-voltage?
3. What are partial molar quantities?
4. What is chemical potential and why is it called so?
5. State and explain Lechatlier principle.
6. Deduce the phase rule.
7. What is meant by partition function?
8. Define micro canonical and macro canonical ensembles.
9. Comment on the statement colloidal solutions are two phase systems.
10. Differentiate between adsorption and absorption.

**Part B**

(5 × 5 = 25)

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

11. (a) Derive Debye-Huckel limiting law.

Or

- (b) Derive Nernst equation.

12. (a) Deduce Van't Hoff's reaction isotherm.

Or

- (b) How will you determine the fugacity of real gases?

13. (a) What are the factors affecting chemical equilibrium?

Or

- (b) Discuss the phase diagram of KI-H<sub>2</sub>O system.

14. (a) Derive Boltzmann distribution law.

Or

- (b) Discuss the thermodynamics properties from partition functions.

15. (a) Write a note on Helmholtz electrical double layer.

Or

- (b) Derive Langmuir adsorption isotherm.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Derive the Debye-Huckel-Onsager equation.

- (b) Derive Tafel equation. (6+4)

17. (a) Give the various statements of second law of thermodynamics.  
(b) Derive Gibbs-Duhem equation. (5+5)
18. (a) Define the following terms.  
(i) law of mass action  
(ii) equilibrium constant (4)  
(b) Draw and explain the phase diagram of Zn-Mg system. (6)
19. Write short notes on  
(a) Fermi-Dirac statistics  
(b) population inversion (5+5)
20. (a) Explain the classification of colloids.  
(b) Derive Gibbs adsorption isotherm. (5+5)
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**F-6358**

**Sub. Code**

**7MCH1E2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Chemistry**

**Elective — POLYMER CHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. What are monomers and polymers?
2. What is meant by block copolymer?
3. Mention any two uses of phenol-formaldehyde.
4. Draw the structure of melamine formaldehyde resin.
5. Give the relationship between glass transition temperature and molecular weight.
6. What is syndiotactic polymer? How does it differ from isotactic polymers?
7. What is meant by polymer degradation? Mention their types.
8. Name any two antioxidants used in polymers and write their structures.
9. Give any two examples of fluoroplastics.
10. Mention the uses of plastics in skin.

**Part B**

(5 × 5 = 25)

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

11. (a) Discuss the processes of vulcanization of rubber.

Or

- (b) How are polymers classified on the basis of polymerization mechanism? Give examples.

12. (a) Write the preparation and structure of tetrafluoroethylene.

Or

- (b) How is polyurethane prepared? Mention its uses.

13. (a) Equal number of molecules with  $M_1 = 35,000$  and  $M_2 = 1,75,000$  are mixed. Calculate Number-average molar mass and Mass-average molar mass.

Or

- (b) Describe the viscosity method of determining molecular weight of macromolecules.

14. (a) Describe Bulk polymerization technique.

Or

- (b) What is meant by Hydrolytic degradation? How does it work in polymers?

15. (a) What are the role of plasticizers and fire retardants in plastic processing?

Or

- (b) Explain the terms: film extrusion and fibres.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Write a note on graft polymers  
(b) Discuss the classification of polymers on the basis of structure and physical properties (5+5)
17. Discuss the preparation and uses of the following:  
(a) Urea-formaldehyde (b) PMMA (5+5)
18. (a) Discuss the various factors affecting the glass transition temperature  
(b) Explain the intrinsic properties and isomerism of polymers (5+5)
19. (a) Describe the technique of interracial poly condensation polymerization  
(b) Explain ultrasonic degradation of polymers with suitable examples (5+5)
20. (a) Explain the techniques of blow technique  
(b) Discuss the process of Thermofoaming with neat diagram (5+5)

**F-6359**

**Sub. Code**

**7MCH2C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Second Semester**

**Chemistry**

**ORGANIC CHEMISTRY – II**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

- 1, 1-disubstituted cyclohexanes cannot exhibit any configurational isomerism. Explain.
- Write down the conformational enantiomers of 2, 3-dimethylbutane.
- What is meant by Finger print region?
- Explain Bathochromic and Hypsochromic shift
- There is a difference of 4.6 ppm in the  $^1\text{H}$  chemical shifts of  $\text{CHCl}_3$  and  $\text{CH}_3\text{CCl}_3$ . What is the chemical shift for the protons in  $\text{CH}_3\text{CCl}_3$ ? Explain your reasoning.
- What is meant by relaxation time?
- What is Phase Transfer Catalyst?
- Give any two applications of selenium dioxide in organic synthesis.

9. Give the structure of  $5\alpha$  and  $5\beta$  -cholanolic acid.
10. What happens when Oestrone is subjected to
- (a) Catalytic hydrogenation and
  - (b) Wolff-Kishner reduction.

**Part B**

(5 × 5 = 25)

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

11. (a) Discuss the conformation of simple acyclic compounds.

Or

- (b) Write an account on quantitative treatment of mobile systems.

12. (a) How is Woodward rule used to calculate  $\lambda_{\max}$  of compounds? Explain.

Or

- (b) Give brief account on the following

- (i) Metastable ions and
- (ii) Isotopic ions.

13. (a) Explain chemical shift of protons and discuss the influence of stereochemical factor on it.

Or

- (b) Write notes on (i) CIDNP and (ii) Double resonance technique.

14. (a) Give an account on the synthetic application of

- (i) LDA
- (ii) 1,3-dithiane.

Or

- (b) Discuss the catalytic reduction with suitable examples.

15. (a) Give the synthesis of Progesterone from ergosterol.

Or

- (b) Discuss conformation aspects of A/B C in steroids.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Make molecular models for the most stable conformation for the following compounds
- (i) Trans-1-tert-butyl-3-methylcyclohexane
  - (ii) Cis-1-tert-butyl-3-methylcyclohexane (2×1=2)
- (b) How will you determine the free energy difference by Eliel-Ro equation? (5)
- (c) Explain the conformations of ethane. (3)
17. (a) The peak in the UV-VIS spectrum of acetone [(CH<sub>3</sub>)<sub>2</sub>C=O] corresponding to the  $n \rightarrow \pi^*$  transition appears at 279 nm when hexane is the solvent, but shifts to 262 nm in water. Which is more polar, the ground electronic state or the excited state? (3)
- (b) Explain Mc Lafferty rearrangement. (4)
- (c) Write notes on molecular vibration. (3)
18. (a) A compound (C<sub>4</sub>H<sub>6</sub>) has two signals of approximately equal intensity in its <sup>13</sup>C NMR spectrum; one is a CH<sub>2</sub> carbon at  $\delta$  30.2 ppm, the other a CH at  $\delta$  136 ppm. Identify the compound. (3)
- (b) Write notes on (i) Spin-spin splitting and (ii) basic principle of FT NMR technique. (7)

19. (a) Explain the mechanism of osmium tetroxide and oppenauer oxidation. (7)
- (b) Write notes on Woodward and Prevost hydroxylation. (3)
20. (a) Prove the following in cholesterol structure, (6)
- (i) Nature and position of the side-chain.
- (ii) Position of the two angular methyl groups.
- (b) How Cortisone is synthesized? (4)
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**F-6360**

**Sub. Code**

**7MCH2C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Second Semester**

**Chemistry**

**INORGANIC CHEMISTRY – II**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Account for the structure of  $\text{Ni}(\text{CO})_4$  using VB theory.
2. Calculate the CFSE value for the high spin octahedral complex of  $d^7$  configuration.
3. Give an example for acid hydrolysis reactions in coordination compounds.
4. Point out the effect of metal ion on the rate of substitution reactions of coordination compounds.
5. What is meant by oxidative phosphorylations?
6. List the functions of a non-heme iron protein.
7. What is meant by Reppe's catalysts?
8. Give an example for ligand association reactions.

9. What is the difference between nuclear reaction and chemical reaction?
10. Fission products usually undergo  $\beta$ -decay. Why?

**Part B**

(5 × 5 = 25)

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

11. (a) Give the drawbacks of (i) VB theory and (ii) crystal field theory.

Or

- (b) Discuss the Jahn Teller effect with its consequences.

12. (a) Using Trans effect how do you synthesise cis- and trans-  $\text{Pt}(\text{NH}_3)_2\text{Cl}_2$  complex.

Or

- (b) Explain the mechanism of binuclear nucleophilic substitution reactions.

13. (a) Write short notes on blue copper protein.

Or

- (b) Discuss the structure and function of Hemoglobin in dioxygen transport.

14. (a) Explain with mechanism the use of Wilkinson catalyst in hydrogenation reaction.

Or

- (b) Write notes on oxidative addition and reductive eliminations reactions.

15. (a) Describe the liquid drop model with respect to mechanism of nuclear fission and its limitations.

Or

- (b) (i) How is the electrical energy derived from fission reaction in a power reactor? (2)  
(ii) How is plutonium separated from fission products? (3)

**Part C** (3 × 10 = 30)

Answer any **three** questions.

16. (a) How is stability constant determined by spectrophotometric method?  
(b) Describe the factors affecting stability constant in solution. (5+5)
17. (a) Write notes on anation reactions with example.  
(b) Give an account of inner and outer sphere reactions with suitable examples. (5+5)
18. Describe the process of nitrogen fixation in vivo and in vitro.
19. Describe the organometallic catalysis involved in the conversion of  
(a) Acetic acid from methanol and  
(b) Oxidation of alkenes to aldehydes and ketones. (5+5)
20. (a) Explain the thermonuclear reaction in stars. (5)  
(b) Discuss the nuclear transmutation reaction. (5)

**F-6363**

**Sub. Code**

**7MCH3C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.**

**Third Semester**

**Chemistry**

**ORGANIC CHEMISTRY – III**

**(CBCS – 2017 onwards)**

Time : 3 Hours

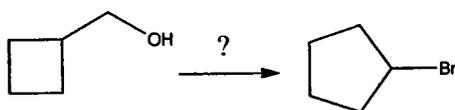
Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Comment, Baeyer-villiger oxidation of unsymmetrical ketones is regioselective.
2. Specify the reagent and condition for the following reaction



3. Explain Wittig reaction.
4. Give an example for free radical addition.
5. State Isoprene rule.
6. How many double bonds are present in zingiberene and how will you account for it?

7. What is meant by retro synthetic analysis? Give examples.
8. How ketones are protected during organic synthesis?
9. The intersystem crossing efficiency is nearly 100 % for benzophenone, but it is almost zero for 1, 3-butadiene. Explain
10. Define conrotatory and disrotatory motions.

**Part B**

(5 × 5 = 25)

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

11. (a) Discuss the mechanism of Dienone-phenol rearrangement. Prove whether the rearrangement is Intra- or Inter molecular.

Or

- (b) Give the mechanism of Sommelet reaction.

12. (a) Discuss the addition of Grignard reagent to  $\alpha, \beta$  – unsaturated carbonyl groups with suitable examples.

Or

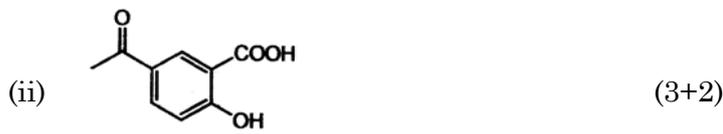
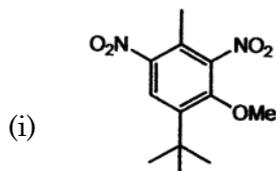
- (b) Write a note on Sharpless asymmetric epoxidation.

13. (a) Discuss the biosynthesis of terpenoids.

Or

- (b) (i) Explain what happens when abietic acid undergoes oxidation with  $\text{KmnO}_4$ . (2)
- (ii) How will you prove the presence and position of double bonds in abietic acid? (3)

14. (a) Give the retrosynthetic analysis for the following compounds,



Or

- (b) Give a brief account on,
- (i) Robinson annelation,
  - (ii) Umpolung synthesis.
15. (a) Draw the Jablonski diagram and explain the various photophysical process in an excited state.

Or

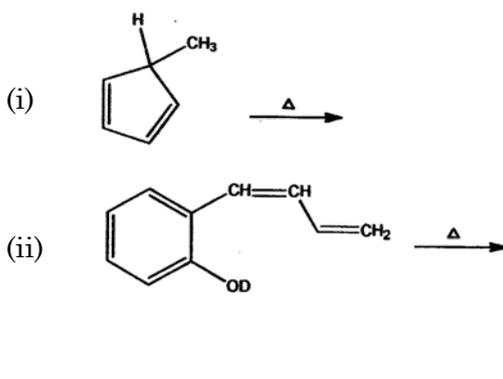
- (b) With the help of the correlation diagram, show that [2 + 2] cycloaddition reaction is photochemically allowed reaction.

**Part C** (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the mechanism for the following,
- (i) Di-pi methane rearrangement,
  - (ii) Arndt-Eistert reaction. (6)
- (b) What is Vilsmeier-Haack reaction? (4)

17. Discuss the mechanism of Claisen ester condensation and Mannich reaction.
18. Describe the structure and give the synthesis of  $\alpha$ -pinene.
19. Give the systematic synthesis of 2,4-dimethyl-2-hydroxypentanoic acid.
20. (a) Write notes on,
- (i) Paterno-Buchi reaction,
  - (ii) Forbidden transitions. (6)
- (b) Predict the products obtained by sigmatropic rearrangement. (4)



**F-6364**

**Sub. Code**

**7MCH3C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Chemistry**

**INORGANIC CHEMISTRY – III**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define the term isomer shift.
2. The stretching frequency of ligated carbonyl is always lower than free carbonyl. Explain.
3. Write the selection rules for electronic spectra.
4. What is meant by contact shift?
5. Explain EAN rule with an example.
6. Give the structure of basic beryllium acetate.
7. How is oxidation / reduction of lanthanides useful to separate them?
8. d-d bands are broad but f-f transitions give sharp and line-like peaks. Explain.

9. What are polyacids? How are they classified?
10. Find the styx numbers for  $B_4H_{10}$ .

**Part B**

(5 × 5 = 25)

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

11. (a) Arrange  $[Cr(CO)_6]$ ,  $[Mn(CO)_6]^+$ ,  $[V(CO)_6]^-$  and  $[Ti(CO)_6]^{2-}$  in the order of increasing  $\bar{\nu}_{Co}$  values.

Or

- (b) Explain the factors affecting isomer shift in Mossbauer spectra.
12. (a) Explain the  $^{19}F$  – NMR spectrum of  $SF_4$  and  $ClF_3$ .

Or

- (b) Write notes on charge transfer complexes.
13. (a) Explain the extraction of Be from its ore.

Or

- (b) Give the synthesis and properties of (i)  $Ni(CO)_4$   
(ii)  $Co_2(CO)_8$ .
14. (a) Explain the position of lanthanides and actinides in the periodic table.

Or

- (b) Write the uses of lanthanides and their compounds.
15. (a) Write notes on nomenclature of boranes based on Wade's rules.

Or

- (b) Explain structure and bonding in boranes.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the applications of IR and Raman spectra in the study of coordination compounds. (6)
- (b) Explain the Mossbaure spectrum of (i)  $\text{FeSO}_4 \cdot \text{H}_2\text{O}$  and (ii)  $[\text{Fe}(\text{CN})_6]^{-4}$ . (4)
17. (a) Sketch and explain the transitions involved in the Orgel diagram of  $[\text{V}(\text{H}_2\text{O})_6]^{2+}$  ion. (5)
- (b) Explain contact shifts and pseudo contact shift with suitable examples. (5)
18. (a) Describe the isolation and purification of Se from its ores. (5)
- (b) Explain structure and bonding in ferrocene. (5)
19. (a) What is lanthanide contraction? Explain its consequences. (5)
- (b) Describe the extraction of uranium from its ore. (5)
20. (a) Write notes on isopoly anions of Mo and W. (5)
- (b) Explain the Keggin structure of 12-heteropolyacids. (5)

**F-6365**

**Sub. Code**

**7MCH3C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Chemistry**

**PHYSICAL CHEMISTRY – III**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is chemiluminescence? Explain with an example.
2. Write Stern - Volmer equation and the terms present.
3. What are linear operators?
4. State de Broglie's principle.
5. What are eigen function and eigen values?
6. What is meant by the term degeneracy of the energy states?
7. What are symmetric and anti symmetric wave functions?
8. What are spherical harmonics?
9. Distinguish between Van't Hoff and Arrhenius complexes.
10. Define homogeneous and heterogeneous catalysis.

**Part B**

(5 × 5 = 25)

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

11. (a) Write briefly on photosynthesis.

Or

- (b) Explain the phenomenon of photosensitisation.

12. (a) Show that kinetic energy operator is Hermitian.

Or

- (b) Derive the quantum mechanical operator for potential energy.

13. (a) Solve the Schrodinger wave equation for an electron moving in a ring.

Or

- (b) What are orthogonal and normalised wave functions?

14. (a) State and prove variation theorem.

Or

- (b) Setup the Schrodinger wave equation for simple harmonic oscillation and obtain its solution.

15. (a) Write a note on thermal conductivity of gases.

Or

- (b) Describe stopped flow method for studying kinetics of fast reactions.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Write a note on chemical actinometers.
- (b) Discuss the mechanism, rate law and quantum yield of photo chemical  $H_2 - Br_2$  reaction. (5+5)
17. (a) State the four postulates of quantum mechanics.
- (b) Derive the quantum mechanical operator for angular momentum. (4+6)
18. (a) Set up the Schrodinger wave equation for a particle moving in a 3D box.
- (b) Derive Schrodinger wave equation. (5+5)
19. Using HMO theory calculate the delocalisation energy for butadiene system.
20. (a) Explain the principle of equipartition of energy.
- (b) Derive Michaelis - Menton equation and explain the effect of concentration of the substrate on rate. (4+6)
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**F-6366**

**Sub. Code**

**7MCH3E1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Chemistry**

**Elective : PHARMACEUTICAL CHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Give the classification of drugs with example.
2. Explain the reasons for prodrug formation.
3. Define macrolide antibiotics and its chemistry.
4. Draw the structure of streptomycin and penicillin G.
5. Write the structure and chemical name of cyclophosphamide.
6. Give the causes of cancer.
7. What is meant by anti-infective drugs?
8. Write the synthesis and chemical name of atenolol.
9. Give the uses of aspirin and paracetamol.
10. What are volatile general anaesthetics?

**Part B**

(5 × 5 = 25)

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

11. (a) (i) Draw any two structures of lead compounds. (2)  
(ii) List out the advantages of lead modification. (3)

Or

- (b) Give an account on, (i) Isosterism and bio-isosterism, (ii) Resonance effect. (3+2)
12. (a) Discuss the SAR of cephalosporin.

Or

- (b) Give the synthesis of Penicillin-V.
13. (a) Give the synthesis for the following  
(i) mechlorethamine and (ii) 6- mercaptopurine

Or

- (b) Explain the mode of action of hypnotics.
14. (a) Discuss the role of drug inhibitors in cardiovascular diseases.

Or

- (b) Give the synthesis of verapamil.
15. (a) Write the synthesis and therapeutic action of nifedipine.

Or

- (b) Explain local anaesthetics. Give its classification.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Explain the process of drug absorption and the various factors affecting it.
- (b) Discuss induced fit theory.
17. (a) How are antimalarial drugs classified? (3)
- (b) How is chloroquine synthesized? (3)
- (c) Explain the structural features of chloramphenicol. (4)
18. Write notes on,
- (a) Role of antimetabolites in treatment of cancer and
- (b) General anaesthetics.
19. (a) Write a note on central intervention of cardiovascular output.
- (b) Discuss the synthesis of methyldopa.
20. (a) Write notes on pethidine and phenacetin.
- (b) Discuss the therapeutic action of captopril and guanethidine.

**F-6526**

**Sub. Code**

**7MCH3E2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.**

**Third Semester**

**Chemistry**

**Elective : MATERIAL CHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Distinguish between ionic bond and secondary bond.
2. Define space lattice.
3. What is stress strain behavior of polymeric materials?
4. What is meant by conducting polymer?
5. What are the key chemical structures of liquid crystals used in display technology?
6. What are macroscopic composite? Give examples.
7. Where are the ferrite ceramics used?
8. Define coefficient of thermal expansion.
9. Define spin triplet super conductivity.
10. Mention some examples of ionic conductors with their molecular formula.

**Part B**

(5 × 5 = 25)

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

11. (a) Explain the synthesis and structure of ionic and semi conducting ceramic materials.

Or

- (b) What are point and line defects? Explain.

12. (a) How are polymers classified? Explain their applications.

Or

- (b) Discuss the Factors that influence the mechanical properties of polymers.

13. (a) Discuss the optical properties of liquid crystals.

Or

- (b) Enumerate the preparation and applications of nanocrystalline materials.

14. (a) What are the materials used in lasers? Mention their applications.

Or

- (b) Write a note on ceramic magnets.

15. (a) Discuss the mechanism of ionic conduction.

Or

- (b) What are conducting organics? How are they characterized?

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the edge and screw dislocation of crystal  
(b) What is radius ratio rule? Explain its use in elucidating crystal system
17. Explain the following:  
(a) Deformation behaviours of polymers  
(b) Displacement model for viscoelasticity.
18. (a) Discuss the mechanical properties of ceramic materials.  
(b) What are liquid crystals? Explain their different crystal phases and molecular arrangement.
19. Describe the optical and Thermal properties of ceramic materials
20. (a) Discuss the application of organic solids used in sensors and switches.  
(b) What are fullerenes? How are they used as super conductors?

**F-5429**

**Sub. Code**

**7MCH1E1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Chemistry**

**ELECTIVE-APPLIED CHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define hardness of water.
2. What is meant by priming?
3. Give the composition of water gas.
4. Write the uses of producer gas.
5. Mention the composition of optical glass.
6. What are fertilizers? Give their need.
7. What is molasses?
8. Give the synthesis of alathrin.
9. What is meant by thin film lubrication?
10. List the uses of phosphate coatings.

**Part B** (5 × 5 = 25)

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

11. (a) Describe the different types of hardness.

Or

- (b) Write short notes on colloidal and calgon conditioning.

12. (a) Give short notes on the classification of fuels.

Or

- (b) Write notes on octane rating of petrol.

13. (a) Discuss the mechanism of setting of cement.

Or

- (b) Give an account of fertilizer industries in India.

14. (a) Write notes on the manufacture of sugar.

Or

- (b) What are insecticides and herbicides? Give its important categories and explain.

15. (a) What are solid lubricants? Discuss their characteristics with suitable example.

Or

- (b) Discuss the constituents and functions of paints.

**Part C** (3 × 10 = 30)

Answer any **three** questions.

16. Describe zeolite and Reverse osmosis process of water treatment.

17. (a) Give an account of "energy for chemical industry".

- (b) Give the characteristic properties and uses of coal gas, oil gas and gobar gas. (4 + 6)

18. (a) Describe the manufacture of glass.  
(b) Give the manufacturing process of urea (5 + 5)
19. Explain the synthesis and mode of action of  
(a) Prathion  
(b) Malathion and  
(c) DDVP (3 + 3 + 4)
20. (a) Discuss the mechanism of drying of paint.  
(b) Write notes on electrodeless plating and anodizing processes. (5 + 5)
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