CHEMISTRY MODEL QUESTION PAPERS

ADIKAVI NANNAYA UNIVERSITY :: RAJAHMAHENDRAVARAM
B.Sc Chemistry Syllabus (w.e.f: 2020-21 A.Y)

MODEL QUESTION COURSE
B. Sc DEGREE EXAMINATION
SEMESTER: I
Course 1: INORGANIC & PHYSICAL CHEMISTRY

Time: 3Hrs. **Max. Marks: 75**

Section - A

Answer any **FIVE** of the following questions. Each carries **FIVE** marks **5 X 5 = 25 M**

1. Explain the preparation & structures of Phosphonitrilic compounds.
2. Explain in brief, catalytic properties & stability of various oxidation states of d- block elements.
3. Write a short note on Bravais lattices and crystal systems.
4. What are Semitic & Nematic liquid Crystals? Explain.
5. Write an account on Common ion effect & Solubility product.
6. Describe Andrew's isotherms of carbon dioxide.
7. Explain Actinide Contraction.
8. Explain the structure of Borazine.

Section - B

Answer **ALL** the questions. **5 X 10 = 50 M**

9 a). Explain Classification, Preparations & uses of Silicones

(OR)

b). (i) What are Pseudo halogens.
(ii) Explain the Structures of any one AX_3 & AX_5 interhalogen compounds.

10 a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.

(OR)

b). (i) Explain the magnetic properties of d- block elements.
(ii) Explain about Conductors, Semi-Conductors & Insulators using Band Theory.

11. a). Write an essay on Crystal defects.

(OR)

b). What is Bragg's Law? Explain the determination of structure of a crystal by powder method.

12. a). Derive the relationship between Critical constants & vander Waal constants

(OR)

b). (i) Write any 5 differences between liquid crystals & liquids, solids
(ii) Write the applications of Liquid crystals.

13. a). Explain Nernst distribution Law. Explain its applications

(OR)

b). What are colligative properties? Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point.

MODEL QUESTION COURSE

B. Sc DEGREE EXAMINATION

SEMESTER: II

Course 2: ORGANIC & GENERAL CHEMISTRY

Time: 3Hrs. **Max. Marks: 75**

Section - A

Answer any **FIVE** of the following questions. Each carries **FIVE** marks **5X5= 25M**

1. Write different conformations of n-butane. Explain their relative stability.
2. Explain 1,2- & 1,4- addition reactions of conjugated dienes.
3. Explain the orientation effect of halogens on mono substituted benzene.
4. Explain the mechanism of $E1^{CB}$ elimination reaction.
5. Explain the structure of ClF_3 by Valence Bond theory.
6. What are Hard & soft acids & bases? Explain with examples.
7. Draw the Wedge, Fischer, Newman & saw-Horse representations for Tartaric acid.
8. Define Enantiomers and Diastereomers and give two examples for each.

Section - B

Answer **ALL** the questions. Each carries **TEN** marks **5 X 10 = 50 M**

9 (a). i) Write the preparation of alkanes by Wurtz and Corey-House reaction.
ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity in free radical substitutions.

(OR)

(b).(i) Explain Baeyer Strain Theory
(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram.

10 (a). (i) Write any two methods of preparation of alkenes.
(ii) Explain the mechanism of Markovnikov and Anti-Markovnikov addition of HBr to alkene.

(OR)

(b). (i) Explain the acidity of 1-alkynes
(ii) How will you prepare acetaldehyde and acetone from alkynes?
(iii) Write alkylation reaction of terminal alkne.

11.(a). Define Huckel rule of aromatic compounds. What are benzenoid and non- benzenoid aromatic compounds? Give examples.

(OR)

(b). Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.

12.(a). (i) Define Hardy-Schulze rule & Gold number.
(ii) Differentiate Physisorption Or Chemisorption. Explain Langmuir adsorption isotherm.

(OR)

(b). Construct the Molecular Orbital diagram for O_2 and NO and explain their bond order and magnetic property.

13.(a). Define racemic mixture. Explain any two techniques for resolution of racemic mixture.

(OR)

(b).(i) Define Optical activity and Specific rotation.
(ii)Draw the R- & S- isomers of Alanine, Glyceraldehyde.
(iii)Write the E- & Z- isomers of 2-butene.

MODEL QUESTION COURSE

B. Sc DEGREE EXAMINATION

SEMESTER: III

Course 3: ORGANIC CHEMISTRY & SPECTROSCOPY

Time: 3Hrs. **Max. Marks: 75**

Section - A

Answer any **FIVE** of the following questions. Each carries **FIVE** marks. **5x5 25M**

1. Discuss two methods for preparation of aryl halides.
2. Explain the mechanism for Pinacol-Pinacolone rearrangement
3. Discuss the mechanism for Baeyer-villiger oxidation reaction.
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
5. Write the mechanism for Claisen Condensation reaction.
6. Write the selection rules in rotational spectroscopy.
7. Explain Spin – Spin coupling and Coupling Constant.
8. Explain types of electronic transitions in UV spectroscopy.

Section - B

Answer **ALL** the questions. Each carries **TEN** marks **5 X 10 = 50 M**

9 (a). Give the mechanism & stereochemistry of SN^1 & SN^2 reactions of alkyl halides with suitable example.

(OR)

(b). Explain the following reactions with mechanism.

(i) Reimer-Tiemann reaction (ii) Fries rearrangement.

10 (a). Discuss the mechanism for following reactions.

(i) Perkin reaction. (ii) Cannizaro reaction

(OR)

(b). Write the preparation and any three synthetic applications of diethyl malonate.

11.(a). Explain acid and base hydrolysis reaction of esters with mechanism.

(OR)

(b). Explain the mechanisms of Curtius rearrangement & Arndt –Eistert reaction.

12.(a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.

(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.

(OR)

(b).(i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.

(ii) Discuss the principle of NMR spectroscopy.

13.(a). Write Woodward-Fieser rules for calculating λmax for conjugated dienes and α,β – unsaturated carbonyl compounds , and apply them for one example each.

(or)

(b).(i) What is Fingerprint region? Explain its significance with an example.

(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

MODEL QUESTION COURSE

B. Sc DEGREE EXAMINATION

SEMESTER: IV

Course 4: Inorganic, Organic & Physical Chemistry

Time: 3Hrs. **Max. Marks: 75**

Section - A

Answer any **FIVE** of the following questions. Each carries **FIVE** marks. **5x5 25M**

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. What are epimers and anomers. Give examples.
3. Discuss about iso electric point and zwitter ion.
4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
5. Explain Tautomerism shown by nitro alkanes
6. Discuss the basic nature of amines.
7. Write the differences between thermal and photochemical reactions.
8. Derive heat capacities and derive $C_p - C_v = R$

Section - B

Answer **ALL** the questions. Each carries **TEN** marks. **5 X 10 = 50 M**

9 (a).What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.

(OR)

(b).Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series.

10 (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.

(OR)

(b). (i) Explain Ruff's degradation. (ii) Explain Kiliani- Fischer synthesis.

11.(a). What are amino acids? Write any three general methods of preparation of amino acids.

(OR)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole.

12.(a). Write the mechanism for the following.

(i)Nef reaction (ii) Mannich reaction

(OR)

(b).(i) Explain Hinsberg separation of amines.
(ii) Discuss any three synthetic applications of diazonium salts.

13.(a). What is quantum yield? Explain the photochemical combination of Hydrogen- Chlorine and Hydrogen - Bromine.

(OR)

(b). Define entropy. Describe entropy changes in the reversible and irreversible process.

MODEL QUESTION COURSE

B. Sc DEGREE EXAMINATION

SEMESTER: IV

Course 5: : Inorganic & Physical Chemistry

Time: 3Hrs. **Max. Marks: 75**

Section - A

Answer any **FIVE** of the following questions. Each carries **FIVE** marks. **5x5 25M**

1. Write note on Jahn-Teller distortion
2. Explain Labile & inert complexes.
3. Explain Job's method for determination of composition of complex.
4. Explain Thermodynamic derivation of Gibb's phase rule.
5. Explain any two conductometric titrations.
6. Write note on Fuel Cells with examples and applications.
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.
8. Derive Michaels- Menten equation.

Section - B

Answer **ALL** the questions. Each carries **TEN** marks **5 X 10 = 50M**

9 (a).Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.

(OR)

(b).Define CFSE. Explain the factors affecting the magnitude of crystal field splitting energy.

10 (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.

(OR)

(b). (i) Write the biological functions of Haemoglobin and Myoglobin.

(ii) Write a note on the use of chelating agents in medicines.

11.(a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

(OR)

(b). (i) Explain phase diagram for NaCl-water system.

(ii) Explain briefly about Freezing mixtures.

12.(a). Define Transport number. Write an experimental method for the determination of transport number by Hittorf method.

(OR)

(b).(i) Define single electrode potential.

(ii) Explain four types of electrodes with examples.

13.(a). Explain general methods for determination of order of a reaction.

(or)

(b).Explain Collision theory and Activated complex theory of bimolecular reactions.

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MODEL QUESTION PAPER (Sem-end. Exam)

B. Sc DEGREE EXAMINATIONS
Semester - III

Course 6A: Synthetic Organic Chemistry

Time: 3Hrs. **Max.Marks:75**

SECTION – A 5 x 5 = 25 M

Answer any **FIVE** questions. Each question carries 5 Marks

1. Draw Molecular orbital diagram of 1,3-butadiene.
2. Differentiate between electrocyclic reactions and cyclo addition reactions.
3. Explain Norrish Type – I reaction.
4. Define Chemoselectivity and Regio selectrivity.
5. Define FGI, Target molecule and synthon. Give examples.
6. Write the mechanism of Stork – enamine reaction.
7. Explain Heck reaction.
8. Explain Birch reduction with mechanism.

SECTION – B_ 5 x 10 = 50 M

Answer **ALL** questions. Each question carries 10 M

9. a) Explain [2+2] - cycloaddition reaction by any one approach. Derive selection rules.

(OR)

b) Explain Electrocyclic reactions by taking any one example through any one approach.

10. a) Explain Paterno – Buchi reaction and Norrish type – II reaction with an example.

(OR)

b) Draw & Explain Jablonski diagram.

11. a) Write retro synthetic analysis of Cyclohexene and Paracetamol.

(OR)

b) Describe the order of events in retro synthetic analysis. Write retrosynthetic analysis of 4 –nitro toluene.

12. a) Explain the mechanism of Suzuki coupling and Robinson annulation.

(OR)

b) Explain the mechanism of Wittig and Shapiro reactions.

13. a) Write the synthetic applications of PCC and NBS.

(OR)

b) Write the synthetic applications of $LiAlH_4$. Write the mechanism of reduction with $LiAlH_4$.

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MODEL QUESTION PAPER (Sem-end. Exam)

B. Sc DEGREE EXAMINATIONS
Semester - III

Course 6D: Environmental Chemistry

Time: 3Hrs. **Max.Marks:75**

SECTION – A **5 x 5 = 25 M**

Answer any **FIVE** questions. Each question carries 5 Marks

1. Explain the scope and importance of environment in now a days.
2. Write about atomic energy.
3. What are acid rains.
4. Write a brief note on global warming
5. Explain the reasons for hardness of water.
6. Write note about solid waste management.
7. Write about functions and types of ecosystem.
8. Explain biodiversity at global level.

SECTION – B **5 x 10 = 50 M**

Answer **ALL** the questions. Each question carries 10 M

9. a) Write an essay on Renewable resources and non-renewable resources.

(OR)

b) Explain the reactions of atomospheric oxygen and Hydrological cycle.

10. a) Explain the formation and depletion of ozone. Write controlling methods of air pollution.

(OR)

b) Explain the instrumental techniques to monitor pollution.

11. a) Describe the methods used to convert permanent hard water to soft water.

(OR)

b) What are water quality standards and parameters. Define DO, BOD, COD.

12. a) What are toxic effects of cyanide on the environment.

(OR)

b) What are toxic effects of Pesticides, lead and mercury.

13. a) Outline the functions and types of ecosystem.

(OR)

b) Give a detailed account on biodeiversity.

MODEL QUESTION PAPER (Sem-end. Exam)

B. Sc DEGREE EXAMINATIONS
Semester - III

Course 7D: Green Chemistry and Nanotechnology

Time: 3Hrs. **Max.Marks:75**

SECTION – A **5 x 5 = 25 M**

Answer any **FIVE** questions. Each question carries 5 Marks

1. What is Green Chemistry. Write its goals.
2. Write note on green energy and sustainability.
3. Write Heck reaction using sonochemical method.
4. Explain Diel's Alder reaction.
5. Write note on phase transfer catalysis.
6. Write Simmons – smith reaction using ultrasound method.
7. Write a note on nanotechnology.
8. Write applications of nanomaterials.

SECTION – B **5 x 10 = 50 M**

Answer **ALL** the questions. Each question carries 10 M

9. a) Write the basic Principles of green chemistry.

(OR)

b) What are atom economy reactions. Explain wittig reaction using sonication method.

10. a) Write Suzuki reaction and epoxidation.

(OR)

b) Explain about Green energy and sustainability.

11. a) What are MAOS. Write its advantages and disadvantages.

(OR)

c) Explain Aldol Condensation and Cannizaro reaction.

12. a) Write Green Synthesis of Aidpic acid, Catechol and disodium monoiodo acetate.

(OR)

b) Explain microwave assisted Diel's - Alder reaction and decarboxylation reactions.

13. a) Explain Bottom up and Top Down approachs of synthesis of nanomaterials with examples.

(OR)

b) Write the classification, properties of nanoparticles. Explain Sol- gel method.