

**II Semester B.Sc. Examination, May/June 2018  
(CBCS) (2014-15 and Onwards) (F + R)  
CHEMISTRY – II**

Time : 3 Hours

Max. Marks : 70

**Instructions :** i) The question paper has **two** Parts. Answer **both** Parts.  
ii) Write equations, draw diagrams **wherever** necessary.

## PART – A

I. Answer **any eight** of the following questions. **(8×2=16)**

- 1) Write the values of quantum numbers for  $2s^1$  electron.
- 2) Calculate the energy associated with Bohr's 2<sup>nd</sup> orbit, given the energy of Bohr's 1<sup>st</sup> orbit =  $-2.17 \times 10^{-18} \text{J}$ .
- 3) What is the physical significance of  $\Psi$  and  $\Psi^2$  ?
- 4) Define lattice energy.
- 5) Write the electronic configuration of oxygen molecule using MOT.
- 6) Give one example each of molecule having inter-molecular hydrogen bond and intramolecular hydrogen bonding.
- 7) What are orthosilicates ? Give an example.
- 8) Mention any two applications of Neon.
- 9) Calculate magnetic moment of  $\text{Fe}^{2+}$  ion (atomic number of iron = 26).
- 10) Explain Ullmann reaction with an example.
- 11) Write the cis and trans isomers of stilbene.
- 12) Mention the ortho and one meta orienting group of benzene.

## PART – B

II. Answer **any nine** of the following questions. **(9×6=54)**

- 13) a) Explain the terms : (i) Hamiltonian operator (ii) Laplacean operator.  
b) Write de Broglie's equation, explain the terms. **(4+2)**
- 14) a) Derive an expression for the radius of  $n^{\text{th}}$  orbit of hydrogen atom.  
b) Calculate the wavelength of a moving ball of mass 0.2 kg travelling with a velocity 150 m/s,  $h = 6.63 \times 10^{-34} \text{ Js}$ . **(4+2)**





- 15) a) Derive Schrodinger's wave equation.  
b) Define the term orbital in an atom. (4+2)
- 16) a) Set up Born-Haber cycle for the formation of NaCl crystal, write the expression for lattice energy.  
b) How lattice energy affects the solubility of an ionic crystal ? (4+2)
- 17) a) Discuss the structure of  $\text{BrF}_3$  molecule based on VSEPR theory.  
b) Why is  $\text{H}_2\text{O}$  liquid and  $\text{H}_2\text{S}$  is a gas at room temperature ? (4+2)
- 18) a) Write the molecular orbital diagram of nitrogen molecule and calculate the bond order.  
b) What are polar molecules ? Give examples. (4+2)
- 19) a) What are transition elements ? Why they (i) Exhibit variable oxidation states (ii) Form complex salts.  
b) What are zeolites ? Mention one application. (4+2)
- 20) a) Describe the separation of lanthanides by ion exchange method.  
b) Why  $\text{Cu}^{2+}$  ion is coloured, while  $\text{Cu}^+$  ion is colourless. (4+2)
- 21) a) How is Helium isolated from natural gas ?  
b) Write the reaction of oxidation of toluene by chromyl chloride. (4+2)
- 22) a) Write the mechanism of nitration of benzene.  
b) State Huckel's rule of aromaticity. (4+2)
- 23) a) Explain mechanism of  $\text{S}_{\text{N}}1$  reaction with an example.  
b) Explain Birch reduction reaction. (4+2)
- 24) a) Elucidate the structure of benzene using molecular orbital theory.  
b) State Saytzeff rule, give an example. (4+2)
- 25) a) Explain mechanism of  $\text{E}_1$  (Elimination) reaction with a suitable example.  
b) Why vinyl chloride is less reactive than ethyl chloride ? (4+2)
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II Semester B.Sc. Examination, May 2017  
(CBCS) (2014-15 and Onwards) (F + R)  
CHEMISTRY – II

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) The question paper has **two** Parts.  
2) Answer **both** Parts.  
3) Write equations **wherever** necessary.

## PART – A

Answer **any eight** of the following questions.**(8×2=16)**

1. Define lattice energy.
2. What are polar molecules ? Give an example.
3. Explain intra molecular hydrogen bonding with an example.
4. Explain wave particle duality.
5. State Heisenberg's uncertainty principle. Write its mathematical form.
6. Write the possible values of  $l$  and  $m$ , when  $n = 3$ .
7. Calculate the magnetic moment of  $\text{Cr}^{3+}$  ion. (At no. of Chromium is 24).
8. Explain Huckel's rule of aromaticity with an example.
9. Write the cis and trans isomers of stilbene.
10. How is the conversion of toluene into benzaldehyde effected ? Give the equation.
11. State Saytzeff rule. Give an example.
12. Name the inert gas used in
  - I) Nuclear reactors.
  - II) Radio therapy.





## PART - B

Answer any nine of the following questions.

(9×6=54)

13. a) Explain the significance of quantum numbers. (4+2)  
b) Define the terms Eigen values and Eigen functions. (4+2)
14. a) Derive an expression for the radius of  $n^{\text{th}}$  orbit of hydrogen atom. (4+2)  
b) Calculate the wave length of a moving ball of mass 0.2 kg travelling with a velocity of 150 m/s,  $h = 6.625 \times 10^{-34} \text{ JS}^{-1}$ . (4+2)
15. a) Explain the terms (i) Hamiltonian operator (ii) Laplacean operator. (4+2)  
b) Write Schrodinger wave equation and indicate the terms involved. (4+2)
16. a) Set up Born-Haber's cycle for the formation of Sodium Chloride crystal and compute the calculation for lattice energy of the crystal. (4+2)  
b) Account for the electrical property of semi conductors based on band theory. (4+2)
17. a) Discuss the structure of ammonia molecule based on VSEPR theory. (4+2)  
b) Give the consequence of hydrogen bonding in (i) DNA (ii) Protein. (4+2)
18. a) Explain  $sp^3$  hybridization taking  $\text{SiCl}_4$  as an example. (4+2)  
b) Define dipole moment. Write its SI unit. (4+2)
19. a) What are silicates ? How are they classified based on structure ? (4+2)  
b) What are interstitial compounds ? (4+2)
20. a) Give any four differences between d and f block elements. (4+2)  
b) Mention any two consequences of lanthanide contraction. (4+2)
21. a) Describe the separation of lanthanides by ion exchange method. (4+2)  
b) What are transuranic elements ? Give two examples. (4+2)
22. a) How is  $\text{XeF}_6$  prepared ? Explain its structure. (4+2)  
b) Explain Birch reduction reaction. (4+2)
23. a) Explain the mechanism of nitration of benzene. (4+2)  
b) How is the conversion of naphthalene into phthalic acid effected ? Give equation. (4+2)
24. a) Explain the orienting influence of  $-\text{CH}_3$  group in toluene towards electrophilic substitution. (4+2)  
b) How is biphenyl prepared from Ullmann reaction ? (4+2)
25. a) Explain the mechanism of  $\text{SN}^2$  reaction with a suitable example. (4+2)  
b) Between vinylchloride and allylchloride which is more reactive and why ? (4+2)





II Semester B.Sc. Examination, May 2016  
(CBCS) (2014-15 and Onwards) (F + R)  
CHEMISTRY (Paper – II)

Time : 3 Hours

Max. Marks : 70

**Instructions :** 1) The question paper has **two** Parts. Answer both the Parts.  
2) Write diagrams, equations **wherever** necessary.

## PART – A

Answer **any eight** of the following questions :**(8×2=16)**

1. Write the shapes of the orbitals when  $l = 0$  and  $l = 1$ . ✓
2. Write Radial probability distribution curve for 1s electron.
3. Write Schrodinger's wave equation and explain the terms involved. ✓
4. Write Born-Landé equation of lattice energy. Name the terms involved. ✓
5. Which of the following is polar molecule  $H_2O$ ,  $CO_2$  ? Give reason.
6. Give an example for each of the following :
  - i) Intermolecular – H – bond
  - ii) Intramolecular – H – bond. ✓
7. What are orthosilicates ? Give an example.
8. Give the reaction of  $XeF_4$  with water. ✓
9. Cupric chloride is blue, while cuprous chloride is colourless. Give reason.
10. How is toluene converted into Benzaldehyde ? Give equation.
11. How is anthracene converted into anthraquinone ?
12. Mention the factors which effects  $SN^1$  reaction. ✓



## PART – B

Answer **any nine** of the following questions :

(9×6=54)

13. a) Explain the terms (i) Hamiltonian operator (ii) Laplacean operator.  
b) Calculate the energy associated with the Fourth Bohr orbit in hydrogen atom.  
Given the energy of Bohr first orbit is  $-2.17 \times 10^{-18}$  J. (4+2)
14. a) Write any four postulates of quantum mechanics.  
b) State Heisenberg's uncertainty principle. Write its mathematical form. (4+2)
15. a) Derive an expression for the energy of the first Bohr orbit in Hydrogen atom.  
b) Calculate the wavelength of the wave associated with an electron moving with velocity  $4.0 \times 10^6$  ms<sup>-1</sup>, Electronic mass =  $9.1 \times 10^{-31}$  Kg,  $h = 6.63 \times 10^{-34}$  Js. (4+2)
16. a) Setup Born-Haber cycle for the formation of magnesium oxide crystal. Write the expression for lattice energy.  
b) Write any two differences between sigma bond and pi bond. (4+2)
17. a) Explain sp hybridization with an example.  
b) HF has higher boiling point than HCL why ? (4+2)
18. a) On the basis of VSEPR theory explain the shape of BrF<sub>3</sub> molecule.  
b) State Fajan's rule. (4+2)
19. a) Explain the characteristics of transition elements with respect to (i) variable oxidation states (ii) Magnetic properties.  
b) Why are the elements with At. No 58 to 71 placed separately in the periodic table ? (4+2)
20. a) How is Helium isolated from natural gas ?  
b) Write structure of basic unit present in pyrosilicates. (4+2)





21. a) Write molecular orbital diagram of  $\text{Be}_2$  molecule and calculate the bond order.  
b) Write the electronic configuration of  $\text{He}_2^+$  ion. (4+2)
22. a) Discuss the mechanism of nitration of Benzene.  
b) Give an example Diel-Alder reaction. (4+2)
23. a) Explain mechanism of  $\text{SN}^1$  reaction with an example.  
b) How is Biphenyl prepared ? Name the reaction. (4+2)
24. a) Explain orienting influence  $-\text{OH}$  group in phenol.  
b) Compare the reactivities of alkyl halide and vinyl halide. (4+2)
25. a) What are intrinsic semiconductors ? Give an example.  
b) Why chromium in the +6 oxidation state is diamagnetic ? Write electronic configuration of chromium.  
c) Explain Hoffman elimination reaction with an example. (2+2+2)
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SA – 629

II Semester B.Sc. Examination, April/May 2015  
(CBCS) (2014-15 and Onwards)  
CHEMISTRY (Paper – II)

Time : 3 Hours

Max. Marks : 70

**Instructions :** i) The question paper has **two** Parts. Answer **both** the Parts.  
ii) Write diagrams, equations **wherever** necessary.

## PART – A

I. Answer **any eight** of the following questions : (8×2=16)

- 1) Define the term orbital in an atom.
- 2) Write the radial probability distribution curve for 1S orbital.
- 3) Calculate the energy associated with Bohr's 3<sup>rd</sup> orbit given the energy of Bohr's 1<sup>st</sup> orbit =  $-2.17 \times 10^{-18}$  J.
- 4) Write one consequence of hydrogen bonding.
- 5) Mention the type of hybridisation in  
i)  $\text{PCl}_5$  *Becl<sub>2</sub>* ii)  $\text{SF}_6$ .
- 6) Define bonding molecular orbital.
- 7) What are zeolites ? Mention one application.
- 8) Give one method of preparation of xenon trioxide.
- 9) Calculate the magnetic moment of  $\text{Fe}^{+3}$  ion.  
[atomic number of iron = 26]
- 10) Write Ullmann's reaction.
- 11) Give an example of Diel's alder reaction.
- 12) Mention two ortho-para orienting groups of benzene.

## PART – B

II. Answer **any nine** of the following questions : (9×6=54)

- 13) a) Explain the terms :  
i) Hamiltonian operator      ii) Laplacean operator.
- b) Calculate the wavelength of a moving ball of mass 200 g travelling with a velocity 150 m/s.  $h = 6.625 \times 10^{-34}$  JS. (4+2)

P.T.O.





- 14) a) Explain the significance of  
i) Principal Quantum Number      ii) Spin Quantum Number.  
b) Write de Broglie's equation. Explain the terms. (4+2)
- 15) a) Derive Schrodinger's wave equation.  
b) Write the mathematical expression for Heisenberg uncertainty principle. (4+2)
- 16) a) Derive an expression for the Bohr's  $n^{\text{th}}$  orbit.  
b) What is quantisation of angular momentum of electron ? (4+2)
- 17) a) Calculate the lattice energy to NaCl using Born-Lande equation :  
 $A = 1.748$ ,  $r_0 = 0.281$  mm,  $\eta = 8$ .  
b) What is the effect of lattice energy on the solubility of ionic compounds ? (3+3)
- 18) a) Explain the Band theory of metallic bond.  
b) Write the molecular orbital configuration of  $O_2$  molecule. (4+2)
- 19) a) Applying VSEPR theory explain the shape of water molecule.  
b) Explain  $SP^2$  hybridisation with an example. (3+3)
- 20) a) Explain the variable oxidation states of 3d series of transition elements.  
b) Give one example each for  
i) Orthosilicate      ii) Pyrosilicate. (4+2)
- 21) a) Explain the isolation of helium from natural gas.  
b) Compare the magnetic properties of d-block elements and lanthanides. (3+3)
- 22) a) Explain the separation of lanthanides by ion-exchange method.  
b) Mention the transition elements used as catalysts. (4+2)
- 23) a) Explain  $SN^2$  mechanism with an example.  
b) Write the reaction for the oxidation of toluene with chromylchloride. (4+2)
- 24) a) Explain the orienting influence of nitro group in nitrobenzene towards electrophilic substitution.  
b) Write the resonance structures of anthracene. (4+2)
- 25) a) What are non benzenoids ? Give examples.  
b) Write the mechanism of nitration of benzene. (2+4)
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**GS-305**

II Semester B.Sc. Examination, May/June - 2019

**CHEMISTRY**

**Chemistry - II**

**(CBCS) (F+R) (2014-15 & Onwards)**

Time : 3 Hours

Max. Marks : 70

- Instructions :** (i) The question paper has been **two** parts. Answer **both** the parts.  
(ii) Write equations, draw diagrams wherever necessary.

**PART - A**

**I.** Answer **any eight** of the following questions.

**8x2=16**

1. State Heisenberg's uncertainty principle. Write its mathematical form.
2. Calculate the wavelength of a moving ball of mass 0.6 kg travelling with a velocity 60 m/s,  $h = 6.63 \times 10^{-34} \text{JS}$ .
3. Write two limitations of classical mechanics.
4. Mention the type of hybridisation in (i)  $\text{PCl}_5$  (ii)  $\text{SF}_6$
5. Among  $\text{H}_2\text{O}$  and  $\text{CO}_2$ , which is polar? Give reason.
6. Define bonding molecular orbital.
7. Write the structure of Basic unit present in pyrosilicates.
8. Mention any two consequences of Lanthanide contraction.
9. Cupric chloride is blue, while cuprous chloride is colourless. Give reason.
10. Give an example of Diel's-Alder reaction.
11. State Huckel's rule of Aromaticity.
12. Among alkyl halide and vinyl halide which is more reactive and why?

**PART - B**

**II.** Answer **any nine** of the following questions.

**9x6=54**

13. (a) Derive an expression for the energy of the 1<sup>st</sup> Bohr orbit in hydrogen atom. **4+2**  
(b) Write Schrodinger wave equation. Explain the terms.

**P.T.O.**





14. (a) Write any four postulates of quantum mechanics. 4+2  
(b) What is the difference between orbit and orbital ?
15. (a) Explain the significance of quantum numbers. 4+2  
(b) Write the shapes of the orbitals when  $l=0$  and  $l=1$ .
16. (a) Based on VSEPR theory, explain the shape of Ammonia molecule. 4+2  
(b) What is bond order ? Give its significance.
17. (a) Explain  $sp^2$  hybridisation with an example. 4+2  
(b) Write Born-Lande equation of lattice energy. Explain the terms involved.
18. (a) Write the molecular orbital diagram of  $Be_2$  molecule and calculate 4+2  
the bond order.  
(b) Explain intramolecular H-bonding with an example.
19. (a) Write the structure of the basic unit present in cyclic silicate ? 4+2  
Write the name and formula of a mineral having this structure.  
(b) HF has higher boiling point than HCl why ?
20. (a) How is Helium isolated from Natural gas ? 4+2  
(b) Give one method of preparation of Xenon trioxide.
21. (a) Give any four differences between  $d$  and  $f$ -block elements. 4+2  
(b) Calculate the magnetic moment of  $Fe^{3+}$  ion. [At. no. of Iron = 26]
22. (a) Describe the separation of Lanthanides by Ion-exchange method. 4+2  
(b) Why chromium in +6 oxidation state is diamagnetic ?
23. (a) Explain the orienting influence of  $-CH_3$  group in tolerance towards 4+2  
electrophilic substitution.  
(b) Explain Ullmann reaction with an example.
24. (a) Write the mechanism of Nitration of Benzene. 4+2  
(b) How Anthracene converted to Anthraquinone.
25. (a) Explain the mechanism of  $SN^1$  reaction with an example. 4+2  
(b) State Saytzeff rule with an example.



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**Second Semester B.Sc. Degree Examination, May/June 2019**

(CBCS Scheme – 2018-19 and onwards)

**CHEMISTRY – II**

Time : 3 Hours]

[Max. Marks : 70

Instructions to Candidates :

- 1) The question paper has two parts. Answer both Parts.
- 2) Write chemical equations and draw diagram wherever necessary.

PART – A

Answer any **EIGHT** of the following questions. Each question carries **2** marks :  
**(8 × 2 = 16)**

1. Write de-Broglie's equation, explain the terms.
2. Mention the shapes of orbitals when  $l = 1$  and  $l = 2$ .
3. Write Schrodinger's wave equation and indicate the terms involved.
4. Explain intramolecular hydrogen bonding with an example.
5. Define the terms :
  - (a) Bond angle
  - (b) Bond length.
6. Calculate the magnetic moment of  $Mn^{2+}$  ion. (Given at no. of Mn = 25).
7. Mention the type of hybridization of the central atom in (a)  $BeCl_2$  (b)  $SF_6$ .
8.  $Cu^{2+}$  ion is coloured, but  $Zn^{2+}$  ion is colourless. Give reason.
9. Give a method of preparation of  $XeF_4$ .
10. What is the action of hot alkaline  $KMnO_4$  on toluene? Give equation.
11. Among chlorobenzene and benzylchloride which is more reactive and why?
12. Explain Huckel's rule of aromaticity with an example.



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PART - B

Answer any **NINE** of the following questions. Each question carries **6** marks:  
(9 × 6 = 54)

13. (a) What are quantum numbers? Explain their significance.  
(b) Define the term orbital. (4 + 2)
14. (a) Derive an expression for the energy of  $n$ th orbit in hydrogen atom.  
(b) Explain the significance of wave function. (4 + 2)
15. (a) Explain the hybridization involved in the formation of  $\text{BF}_3$ .  
(b) What are polar molecules? Give an example. (4 + 2)
16. (a) Set up Born-Haber cycle for the formation of  $\text{MgO}$  crystal. Write the expression of lattice energy.  
(b) Define dipole moment. Give its SI unit. (4 + 2)
17. (a) Write the molecular orbital diagram of Nitrogen molecule and calculate bond order.  
(b) Give two applications of Neon. (4 + 2)
18. (a) How is Helium isolated from natural gas?  
(b) What are pyrosilicates? Give an example. (4 + 2)
19. (a) Explain (i) Variable oxidation state (ii) Catalytic property of 'd' block metals.  
(b) What are transuranic elements? Give an example. (4 + 2)
20. (a) Describe the separation of Lanthanides by ion exchange method.  
(b) What are Interstitial compounds? (4 + 2)
21. (a) Discuss the structure of Benzene using molecular orbital theory.  
(b) How do you convert Naphthalene to Phthalic acid? Give equation. (4 + 2)



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22. (a) Explain the mechanism of Nitration of benzene.
- (b) State Saytzeff rule. Give an example. **(4 + 2)**
23. (a) Discuss  $SN^1$  mechanism with an example.
- (b) How do you obtain chlorobenzene from benzene? **(4 + 2)**
24. (a) Explain the method of preparation of styrene.
- (b) Write Born-lande equation for the calculation of lattice energy and indicate the terms.
- (c) What is ferromagnetism? **(2 + 2 + 2)**
25. (a) Give the mathematical form of uncertainty principle and indicate the terms involved.
- (b) 4S orbital is filled before 3d orbital in atoms of atomic number greater than 18. Give reason.
- (c) Calculate the radius of the second orbit of hydrogen atom. Given radius of 1<sup>st</sup> orbit is 0.05292 nm. **(2 + 2 + 2)**
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