

(i) Printed Pages : 7 6 Roll No.

(ii) Questions : 8 Sub. Code :

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Exam. Code :

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**Bachelor of Science (FYUP) 3rd Semester
(2125)**

CHEMISTRY

Paper : General Chemistry-4

Time Allowed : Three Hours] [Maximum Marks : 67

Note :— (i). Question No. 1 consists of Multiple Choice Questions (MCQs) and is a compulsory question.

(ii) Question No. 2 consists of short-answer type questions and is also compulsory.

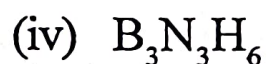
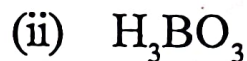
(iii) Units I-III each contain **two** questions with an internal choice. Attempt **one** question from each Unit.

(iv) Attempt a total of **five** questions—**two** compulsory questions (Q.1 and Q.2) and **three** questions from Units I-III.

Compulsory (19 Marks)

1. Attempt the following multiple-choice questions :

(a) The 3c-2e bond is present in

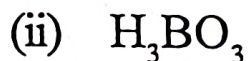


(b) In which of the following C have sp^3 hybridization?

(i) Graphitic compounds (ii) Diamond

(iii) Graphite (iv) Graphene

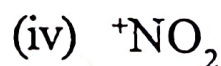
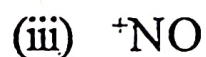
(c) Which of the following is a reducing agent?



(iii) Borax



(d) The electrophile involved during the nitration of benzene is



- (e) Which of the following is not aromatic in nature?
- (i) Tropylium ion (ii) [12]-Annulene
- (iii) [14]-Annulene (iv) Cyclopentadienyl anion
- (f) The overlapping in benzene is of the type
- (i) p-p (ii) sp-sp
- (iii) sp²-sp² (iv) sp³-sp³
- (g) Change in Gibb's free energy is given by
- (i) $\Delta G = \Delta H + T\Delta S$
- (ii) $\Delta G = \Delta H - T\Delta S$
- (iii) $\Delta G = \Delta H \times T\Delta S$
- (iv) $\Delta G = \Delta HT\Delta S$
- (h) In which of the following reactions $K_p = K_c$ are equal
- (i) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
- (ii) $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
- (iii) $N_2(g) + O_2(g) \rightarrow 2NO(g)$
- (iv) $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

(i) The solubility of CO_2 in water increases with

(i) Increase in temperature

(ii) Reduction in gas pressure

(iii) Increase in gas pressure

(iv) Increase in temperature

1×9

2. Answer the following short-answer questions :

(a) Why are Aluminium halides dimeric in nature?

(b) Why CO_2 is gas while SiO_2 is solid?

(c) What is the Wurtz-Fittig reaction?

(d) What is the Gibbs function?

(e) Differentiate between reversible and irreversible reactions.

2×5

UNIT—I

3. (a) What are BN compounds? Discuss one example, giving structure and synthesis.
- (b) Give two methods of synthesis of boric acid and discuss its uses.
- (c) Give the synthesis of alumina. Discuss its important uses.
- (d) Discuss the acidic character of various boron halides.

4,4,4,4

4. (a) Discuss the synthesis and structure of two allotropes of carbon.
- (b) Discuss the chemical properties of CO and CO₂.
- (c) Write a note on covalent carbides, giving a suitable example.
- (d) What are fluorocarbons? Discuss their applications.

4,4,4,4

UNIT—II

5. (a) What are aromatic, non-aromatic and anti-aromatic compounds? Give one example of each.
- (b) Discuss Friedel-Craft acylation, giving its mechanism.
- (c) Explain the structure of benzene.
- (d) Discuss various factors affecting ortho/para ratio.

4,4,4,4

6. (a) What is the SN1 mechanism? Discuss the factors affecting the SN1 mechanism.
- (b) Compare the reactivity of aryl halides and allyl halides, giving suitable examples.
- (c) Explain the role of electron-withdrawing groups in the substitution reaction of aryl halides.
- (d) Discuss elimination and addition reactions in haloarenes with an example. 4,4,4,4

UNIT—III

7. (a) Discuss the Nernst Heat theorem.
- (b) Write a note on residual entropy. How is it calculated?
- (c) What is the third law of thermodynamics? Derive its mathematical relation.
- (d) Discuss the variation of work function with temperature and pressure. 4,4,4,4

- 8: (a) What is Le-Chatelier's principle? Discuss its various applications.
- (b) Derive the Clausius-Clapeyron equation.
- (c) Derive the relationship between ΔG , K_p and Q_p .
- (d) Discuss the thermodynamic derivation of the law of chemical equilibrium. 4,4,4,4