



Name: Roll No.:

Branch: Signature of Invigilator:

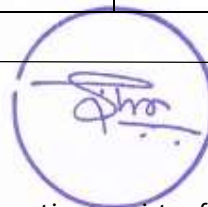
Semester: IVth

Date: 25/04/2022 (MORNING)

Subject with Code: CH213 CHEMISTRY II

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE



1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. Candidates should write their roll no. in each page of the booklet.
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to submit the question paper cum answer sheets before leaving the examination hall.

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc

SEMESTER: IV

BRANCH: Mathematics & computing

SESSION: SP 22

SUBJECT: GENERAL CHEMISTRY II (CH 213)

TIME: 2:00 Hours

FULL MARKS: 50

All questions compulsory.

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PART A: Multiple choice questions (30 Marks)

1. Which one of the following statements concerning the length of carbon-carbon single, double, and triple covalent bonds is true? 1 mark

- (a) The carbon-carbon double bond is shorter than either the carbon-carbon single or triple bond.
- (b) The carbon-carbon single, double, and triple bonds all have the same length.
- (c) The carbon-carbon triple bond is shorter than either the carbon-carbon single or double bond.
- (d) The carbon-carbon single bond is shorter than either the carbon-carbon double or triple bond.

2. sp^2 hybridisation involves the hybridisation of how many atomic orbitals? 1 mark

- (a) 1
- (b) 2
- (c) 3
- (d) 4

3. In compound X, all the bond angles are exactly $109^{\circ}28'$, X is 1 mark

- (a) Carbon tetrachloride
- (b) Ethylene
- (c) Acetylene
- (d) None of the above

4. Chloroethane reacts with sodium in presence of dry ethane. The product is 1 mark

- (a) Ethane
- (b) Ethylene
- (c) Butane
- (d) Butylene

5. Halogenation of alkane is an example of 1 mark

- (a) Electrophilic substitution
- (b) Nucleophilic substitution
- (c) Free radical substitution
- (d) Free radical addition

6. Aqueous solution of which of the following compound on electrolysis give ethane 1 mark

- (a) Sodium formate
- (b) Sodium acetate
- (c) Ethyl acetate
- (d) Ethanoic acid

7. What will be the major product during the reaction of $\text{CH}_3\text{CH}=\text{CH}_2$ with HCl 1 mark

- (a) Propane
- (b) Propanol
- (c) 1-chloropropane
- (d) 2-chloropropane

8. Addition of HCl to propene in presence of H_2O_2 gives 1 mark

- (a) 1-chloropropane
- (b) 2-chloropropane
- (c) 3-chloropropane
- (d) chloropropane per oxide

9. Which of the following alkyl bromide may be used for synthesis of 2,3-dimethylbutane by Wurtz's reaction 1 mark

- (a) n-propyl bromide
- (b) iso-propyl bromide
- (c) n-butyl bromide
- (d) iso-butyl bromide

10. The highest boiling point is expected for 1 mark

- (a) n-butane
- (b) n-pentane
- (c) iso-pentane
- (d) neo-pentane

11. 1,3-butadiene thermally reacts with ethylene to form 1 mark

- (a) Cyclohexene
- (b) Cyclohexane
- (c) Cyclohexatriene
- (d) Benzene

12. Ethylene dibromide on heating with alcoholic KOH mainly gives 1 mark

- (a) Ethane
- (b) Ethylene
- (c) Ethylene bromide
- (d) Acetylene

13. The role of manganese-di-oxide in Leclanche cell or dry cell is 1 mark

- (a) cathode
- (b) anode
- (c) depolarizer
- (d) none of these

14. When Zinc rod and copper rod are dipped in sulphuric acid, we have 1 mark

- (a) Daniel cell
- (b) reversible cell
- (c) irreversible cell
- (d) none of these

15. The negative terminal of a 'Weston cell' is 1 mark

- (a) Cd (Hg)

- (b) Hg
- (c) Hg-Hg₂Cl₂
- (d) none of these

16. The negative plates of a lead acid storage cell under fully charged condition consists of

1 mark

- (a) Spongy lead
- (b) Lead-di-oxide
- (c) Lead sulphate
- (d) None of these

17. In a Proton Exchange Fuel Cell (PFMC) the hydrogen enters the

1 mark

- (a) anode
- (b) cathode
- (c) none of these
- (d) either of these

18. The electrolyte used in calomel electrode is

1 mark

- (a) a paste of mercury and mercurous chloride
- (b) potassium chloride solution
- (c) saturated potassium chloride solution
- (d) none of these

19. Nitric acid is a _____ whereas potassium chloride is a _____. 2 marks

- (a) true electrolyte, potential electrolyte
- (b) potential electrolyte, true electrolyte
- (c) true electrolyte, true electrolyte
- (d) potential electrolyte, potential electrolyte

20. In metal-ligand bond formation, the metal acts as _____ whereas the ligand acts as _____.
_____ 2 marks

- (a) Lewis acid, Lewis base
- (b) Lewis base, Lewis acid
- (c) Lewis base, Lewis base
- (d) none of these

21. K_{sp} of CaF_2 is 3×10^{-11} at 25 degree centigrade. Its solubility at this temperature will be 2 marks

- (a) 4×10^{-4} mol/L
- (b) 2×10^{-4} mol/L
- (c) 4×10^{-6} mol/L
- (d) None of these

22. The average KE of a molecule of carbon-di-oxide at zero degree centigrade is (given, $R = 8.32 \times 10^7$ erg/K/mol) 2 marks

- (a) 5.6×10^{-41} ergs
- (b) 6.5×10^{-14} ergs
- (c) 5.6×10^{-14} ergs
- (d) none of these

23. In a cubic crystal system, the intercepts of a plane are $4a$, $2b$, $6c$. The miller indices of the plane will be: 2 marks

- (a) $\langle 3, 6, 2 \rangle$
- (b) $\langle 6, 3, 2 \rangle$
- (c) $\langle 6, 1, 0 \rangle$
- (d) None of these

24. The viscosity of glycerol, water, chloroform and acetone are in the order 1 marks

- (a) chloroform>water>glycerol>acetone
- (b) glycerol>chloroform>water>acetone
- (c) glycerol>acetone>chloroform>water
- (d) glycerol>water>chloroform>acetone

25. The compressibility factor (z) of an ideal gas is 1 mark

- (a) 0
- (b) 1
- (c) >1
- (d) <1

PART B: Short type questions 20 MARKS (4 X 5)

26. Derive the following from kinetic theory of gases: (a) Boyle's law (b) Avogadro's law (4)

27. Discuss how *common ion effect* is applied in (a) salting of soap (b) table salt production and salt precipitation in general. (4)

28. (a) Draw the products upon epoxidation on ethylene and acetylene. Comment on the ease of their formation. (2)

(b) What is activating and deactivating substituents for aromatic electrophilic substitution? The fluorobenzene is having comparable reactivity with that of benzene towards electrophilic substitution-Explain. (2)

29. Discuss the salient features of potentiometric estimation of chloride in a given sample of water. Explain with relevant chemical equations and schematics. (4)

30. (a) What do you mean by ANTI and SYN elimination? Why does the ANTI geometry favor over the SYN geometry during elimination? (2)

(b) What is Anti-Markownikov addition or peroxide effect or Kharash effect? Explain the reason of the effect. (2)



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