

Total No. of printed pages = 3

**CY 181101**

Roll No. of candidate

1812/23

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BINA CHOWDHURY CENTRAL LIBRARY  
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Azara, Hatkhowapara,  
Guwahati - 781017

2023

**B.Tech 1<sup>st</sup> Semester End-Term Examination**

**CHEMISTRY — 101**

**(Group A) (w.e.f. 2018-19)**

**(New Regulation and New Syllabus)**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

Answer question No. 1 and any *Four* from the rest.

1. Answer the following: (All are compulsory) (10 × 1 = 10)
- (i) In hypsochromic shift, the absorption maximum is shifted towards \_\_\_\_\_ wavelength.
  - (ii) Graphene is \_\_\_\_\_ dimensional allotropic form of \_\_\_\_\_
  - (iii) The oxygen molecule is paramagnetic due to presence of \_\_\_\_\_ number of unpaired electrons.
  - (iv) The monomer of teflon is \_\_\_\_\_
  - (v) NMR spectroscopy indicates the chemical nature of the \_\_\_\_\_ and spatial position of \_\_\_\_\_
    - (a) Electrons, protons
    - (b) Neutrons, electrons
    - (c) Nuclei, electrons
    - (d) Nuclei, neighbouring nuclei
  - (vi) Which of the following is a greener route to produce ethanol commercially
    - (a) Catalytic cracking of ethanol
    - (b) Dehydrogenation of ethylene
    - (c) Steam reforming of methanol
    - (d) Oxidation of ethene with an ionic catalyst

[Turn over

- (vii) Which one of the following is the least heat and corrosion resistant material
- (a) Ceramics
  - (b) Metals
  - (c) Semiconductors
  - (d) Polymers
- (viii) Concrete and fibre glass are the examples of
- (a) Polymers
  - (b) Ceramics
  - (c) Semiconductors
  - (d) Composites
- (ix) Which of the following is an example of optical properties of nanostructure materials
- (a) Melting point
  - (b) Absorption and scattering of light
  - (c) Both (a) and (b)
  - (d) None of the above
- (x) Corrosion due to the formation of cavities around the metal is called as the
- (a) Waterline corrosion
  - (b) Galvanic corrosion
  - (c) Pitting corrosion
  - (d) Soil corrosion

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2. (a) Derive the Schrodinger Wave Equation. (5)
- (b) Discuss in brief the Quantum Mechanical Treatment of Hydrogen-like system. (5)
- (c) What are conducting polymers? Classify different types of conducting polymers. What is p and n-doping? (1 + 2 + 2 = 5)
3. (a) A polymer sample with four molecules having molecular mass 34,000, six molecules having molecular mass 20,000, eight molecules having molecular mass 25,000 and 2 molecules having molecular mass 1,00,000. Calculate number average and weight average molecular weight of the polymer sample. Calculate the PDI value of the polymer sample. (2 + 2 + 1 = 5)
- (b) What is Pilling-Bedworth rule? Explain Small anodic area results in intense corrosion. (2 + 3 = 5)
- (c) Discuss in details the cause of wet corrosion and the mechanism of wet corrosion with the help of chemical equation involved. (5)

4. (a) Discuss six important principle of green chemistry. (6)  
(b) What do you say about the molecular ion peak in the mass spectrum of alcohols? Which peak is of largest abundance in primary alcohols? (4)  
(c) Write the principle and applications of IR spectroscopy. (3 + 2 = 5)
5. (a) What is refractory materials? Classify refractory materials with one example for each class. (1 + 4 = 5)  
(b) Discuss the following terms :  
(i) Carbon foorprint,  
(ii) Ionic liquids (2 + 2 = 4)  
(c) Calculate the percentage of *Atom Economy* of the following reaction (Atomic weight of Fe = 56)  
$$\text{Fe}_2\text{O}_3(s) + 3 \text{CO}(g) \Rightarrow 2\text{Fe}(l) + \text{CO}_2(g)$$
 (4)  
(d) Write two examples of biodegradable polymers. (2)
6. (a) Write various reactions involved during the setting of cement. What are the functions of gypsum during setting of cement? (5 + 1 = 6)  
(b) What are the basic requirements for lubricants? How a lubricant can eliminate contaminants and debris? (3 + 3 = 6)  
(c) Discuss the principle of NMR spectroscopy. (3)
7. Write notes on following (*any three*) (3 × 5 = 15)  
(a) Eigen function and Eigen value  
(b) Types of polymerization  
(c) Bio-nanomaterials  
(d) Solid waste management  
(e) Atomic absorption spectroscopy  
(f) Mechanism of electrochemical corrosion

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