

27/5/19

9.30 - 12.30

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Roll No. ....

**TCH-201**

**B. TECH. (SECOND SEMESTER)  
END SEMESTER EXAMINATION, 2019**

**(ALL BRANCHES)**

**ENGINEERING CHEMISTRY**

**Time : Three Hours**

**Maximum Marks : 100**

**Note :** (i) This question paper contains five questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Total marks assigned to each question are **twenty**.

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Draw the MOT diagram of  $N_2$  molecule.

Arrange  $N_2$ ,  $N_2^+$ ,  $N_2^-$  and  $N_2^{--}$  in increasing order of their stabilities.

- (b) Write short notes on the following :
- (i) Biogas
  - (ii) Calorific value of a fuel.
- (c) (i) Explain the lime-soda process used for softening the hard water.
- (ii) Calculate the temporary and permanent hardness of water whose analysis is as follows :
- $\text{Mg}(\text{HCO}_3)_2 = 7.3 \text{ ppm}$   
 $\text{MgSO}_4 = 3.0 \text{ ppm}$   
 $\text{CaSO}_4 = 3.40 \text{ ppm}$  and  
 $\text{CaCl}_2 = 27.75 \text{ ppm}$

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- (b) Write the main postulates of VSEPR theory. Draw the shape of  $\text{CH}_4$  and  $\text{SF}_4$  molecules.
- (c) (i) Differentiate between Inter and intra molecular H-bonding.
- (ii) Write the main postulates of Electron sea theory, to explain metallic bonding.
2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Write a short note on Free radical. Also write about its formation, structure and stability.
- (b) Differentiate between the following :
- (i) Electrophiles and Nucleophiles
- (ii)  $\text{S}_\text{N}^1$  and  $\text{S}_\text{N}^2$  reactions, with suitable examples and mechanism.
- (c) Define the electrophilic substitution reaction with the example of Nitration of benzene.
3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Differentiate between the following :
- (i) LDPE and HDPE
- (ii) Thermoplastic and Thermosets polymers.

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- (b) Write short notes on the following :
- (i) conducting polymer
- (ii) functionality of a monomer.
- (c) Write the preparation, properties and uses of (i) Bakelite (ii) Kevlar.
4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Write short notes on the following :
- (i) Concentration cell
- (ii) Activation Energy.
- (b) (i) Derive the derivation of Nernst Equation for the calculation of EMF of half cell.
- (ii) What do you meant by electrochemical series ? Also write its significances.
- (c) Calculate the activation energy of a first order reaction, when the rate constant found to be  $1 \times 10^{-7} \text{ sec}^{-1}$  at  $37^\circ\text{C}$  and  $10 \times 10^{-4} \text{ sec}^{-1}$  at  $77^\circ\text{C}$ .
5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Write the basic principle and applications involved in UV-Vis spectroscopy.

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P. T. O.