

**BIT SINDRI**  
**Engineering Chemistry-I**  
**B. Tech. First Semester**  
**Second Mid Semester Examination 2018**

Time allotted:  $1\frac{1}{2}$  hrs

Max. Marks: 20

Answer any five questions.

All Questions carry equal marks

All the Questions in Question No.1 are multiple choice with one correct answer

Q.1. (i) Dipole-induced dipole interactions are present in which of the following pairs:

(a)  $\text{H}_2\text{O}$  and alcohol (b)  $\text{Cl}_2$  and  $\text{CCl}_4$  (c)  $\text{HCl}$  and He atoms (d)  $\text{SiF}_4$  and He atoms

(ii) Real gases will approach the behaviour of ideal gas at

(a) Low temperature and low pressure (b) High temperature and low pressure

(c) High temperature and high pressure (d) Low temperature and high pressure

(iii) Which one of the following gases has the highest Critical temperature?

(a) Nitrogen (b) Ammonia (c) Water vapour (d) Carbon dioxide

(iv) The Critical temperature and reduced temperature of a gas are 150K and 3K respectively.

What is the temperature of the gas- (a) 150K (b) 147K (c) 153K (d) 450K

Q.2. Define Infrared spectroscopy. Describe the various molecular vibrations in this Technique. Explain why  $\text{CO}_2$  molecule is IR active although it has zero dipole moment.

Q.3. What is principle and application of UV spectroscopy. Differentiate between UV-Vis and IR Spectroscopy?

Q.4. Write down Ideal gas equation and compare the same with real gas equation. Predict which will have the higher boiling point:  $\text{N}_2$  or  $\text{CO}$ . Explain Your reasoning.

Q.5. Define Critical Phenomena. Explain the terms Critical temperature, Critical pressure and Critical volume. Explain the significance of Critical temperature by giving a suitable example.

Q.6. What is an ionic bond. Discuss the factors affecting the formation of ionic bond. Explain giving suitable examples why ions with three positive or three negative charges are rare.

Q.7. write notes on any two of the following:

(a) Magnetic Resonance Imaging (MRI)

(b) Spin-Spin Coupling

(c) Chromophore

(d) Hydrogen bond