

Reg. No.....

Name.....

B. Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2019**SEMESTER –5: CHEMISTRY (CORE COURSE)****COURSE: 15U5CRCHE08: PHYSICAL CHEMISTRY - II***(Common for Regular 2017 admission & Improvement 2016/Supplementary 2016/2015 admission)*

Time: Three Hours

Max. Marks: 60

SECTION A***Answer all the questions. Each question carries 1 mark***

1. Electronic spectroscopy is based on absorption of energy in region.
2. The highest or more intense peak in a mass spectrum is called
3. The number of signal in the proton NMR spectrum of propanol is
4. Shift of absorption maximum to longer wavelength is called
5. A non linear molecule has vibrational degrees of freedom.
6. The restoring force per unit displacement of a harmonic oscillator is called
7. The selection rule for pure rotational Raman spectrum of a diatomic molecule is
8. The unit of molar extinction coefficient is (1 x 8 = 8)

SECTION B***Answer any six questions. Each question carries 2 marks***

9. Describe mutual exclusion principle
10. What is meant by photosensitisation?
11. Explain briefly about fingerprint region.
12. Explain zero point energy
13. Why TMS is used as a reference compound in proton NMR spectroscopy
14. Stokes lines have greater intensity than anti-Stokes lines. Why?
15. State Nitrogen rule.
16. What is meant by a rigid rotator? (2 x 6 = 12)

SECTION C***Answer any four questions. Each question carries 5 marks***

17. Explain fluorescence and phosphorescence.
18. Explain the modes of vibration of CO₂ and H₂O which are infra red active.
19. Explain the polarizability concept in Raman spectroscopy.
20. Explain spin-spin coupling in proton NMR spectroscopy.
21. Explain Mclafferty rearrangement.

22. The first line in the rotational spectrum of HCl appears at 21.18 cm^{-1} . Calculate the rotational constant, moment of inertia and bond length of HCl. (5 x 4 = 20)

SECTION D

Answer any two questions. Each question carries 10 marks

23. Derive the expression for moment of inertia and rotational energy of a rigid diatomic molecule (5 + 5 marks)
24. (a) Write a note on chemical shift and factors affecting it in NMR spectroscopy (6 marks)
(b) The fundamental vibrational frequency for HCl is $8.667 \times 10^{13} \text{ s}^{-1}$. Calculate the force constant of H-Cl bond [H = 1.008 & Cl = 35.45] (4 marks)
25. (a) State the laws of photochemistry (4 marks)
(b) Explain the modes of vibration of CO_2 and H_2O . Prepare note on IR and Raman active and inactive modes. (6 marks)
26. (a) Explain the basic principle and theory of mass spectrometry (6 marks)
(b) Give a note on parent ion peak (4 marks)

(10 x 2 = 20)
