B.Sc. DEGREE END SEMESTER EXAMINATION OCTOBER/NOVEMBER 2018

SEMESTER –5: CHEMISTRY (CORE COURSE)

COURSE: 15U5CRCHE08: PHYSICAL CHEMISTRY - II

(Common for Regular 2016 admission & Supplementary 2015 admission)

Time: Three Hours   Max. Marks: 60

SECTION A

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

1. Number of allowed vibrational modes of a linear triatomic molecule is------------ .
2. The chemical shift range (δ value) for an aldehydic functional group is ----------- .
3. What is the selection rule for Raman spectra?
4. The photosensitized isomerization of But 2-ene occurs in presence of ----------- .
5. In cyclic ketones ν for c=O absorption ---------as the size of the ring decreses.
6. A shift of λ_{max} to shorter wavelengths is called -----------.
7. State Karplus equation.
8. In FTIR the region around 1400-900cm^{-1} is ----------- .   (1 x 8 = 8)

SECTION B

*Answer **any Six** questions. Each question carries **2** marks*

9. What are hot bands and overtones in a vibrational spectrum?
10. Calculate the moment of inertia of HCl molecule. Given H= 1.00amu,Cl =4.98amu and r$_0$=0.1275 nm.
11. What you meant by P–branch and R-branch in rotational – vibrational spectroscopy?
12. What is the significance of force constant in IR stretching vibrations.
13. Explain Frank-Condon principle and various types of possible electronic transitions.
14. Differentiate between fluorescence and phosphorescence.
15. Explain Born Oppenheimer approximation.
16. Compare the NMR spectrum of pure anhydrous Ethanol and Ethanol containing water.

(2 x 6 = 12)

SECTION B

*Answer **any Four** questions. Each question carries **5** marks*

17. Why TMS is used as internal standard in NMR?   .
18. The transmittance of aqueous solution of KMnO$_4$ at certain wavelength is 0.01 for a 10^{-4} solution in a 1cm cell. Calculate (a) absorbance (b) molar absorption coefficient of KMnO$_4$ solution.
19. Explain the terms Stokes and anti – Stokes lines with regard to Raman spectra and compare their wavelength in terms of incident radiation.

20. State and explain laws of photochemistry.

21. What is Beer- Lamberts law? Derive the expression. Explain its limitations.

22. Explain briefly chemiluminescence.   (5 x 4 = 20)

SECTION D

*Answer **any Two** questions. Each question carries **10** marks*

23. Explain the basic principle of mass spectrometry.

24. Explain (a) Anisotropic effect (b) Quantum yield (c) Stern –Volmer equation (d) Larmor Precession (d) Zero point energy.

25. Define chemical shift. Explain the factors that affect chemical shifts in NMR spectroscopy.

26. Describe Jablonski diagram showing various photophysical processes.   (10 x 2 = 20)

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