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Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2021

First Degree Programme Under CBCSS

Chemistry

Core Course VII

CH 1543 : PHYSICAL CHEMISTRY – II

(2014 & 2016 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

(Answer **all** questions. **Each** question carries **1** mark).

1. Collection of a large number of essentially independent systems having same energy, volume and number of particles is called _____

2. State Hardy-Schulze law.

3. The property of reversible sol-gel transformation of a colloid is called _____

4. The angular momentum of an electron is an integral multiple of _____

5. The acceptable wave functions are called _____

6. For a linear n-atomic molecule has _____ independent normal modes of vibration.

P.T.O.

7. The essential requirement for a molecule to show rotational spectrum is _____

8. The number of signals in NMR spectra gives _____

9. What is TMS?

10. SEM is mainly used for the study of _____

(10 × 1 = 10 Marks)

SECTION – B

(Answer **any eight** questions. **Each** question carries **2** marks)

11. Explain residual entropy.

12. Why entropy is considered as a measure of disorder of a system.

13. What are the dispersed phases and dispersion media in foam and gel?

14. Write a note on elastic gels.

15. What are the significances of ψ and ψ^2?

16. Explain Linear operator and Laplacian operator?

17. Discuss about rotational constant.

18. What are stokes and antistokes lines?

19. Explain Franck-Condon Principle.

20. A compound shows a proton NMR peak at 120Hz dowfield from the TMS peak in a spectrometer operating at 60MHz. Calculate chemical shift in ppm relative to TMS.

21. Dipolemoment of ammonia is 1.47 D whereas dipolemoment of BF_3 is zero. Explain.

22. Write a note on ferromagnetism.

(8 × 2 = 16 Marks)

SECTION – C

(Answer **any six** questions. **Each** question carries **4** marks)

23. Derive expressions for enthalpy and Cv in terms of partition function.

24. Explain any four methods of preparation of colloids.

25. Discuss about the applications of adsorption.

26. Derive the Bohr angular momentum of the electron from de Broglie equation.

27. What are radial and angular wave functions?

28. Using radiation of wavelength 8×10^3 °A, the first stoke's line appears at a spacing of 400 cm^{-1} from the Rayleigh line. Calculate the frequency of the first antistoke's line in wave number.

29. How will you calculate the bond length of a datomic molecule from its pure rotational spectrum?

30. Write a note on singlet and fritlet states.

31. Write a note on scanning electron microscopy.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. **Each** question carries **15** marks.

32. (a) Write a note on BET theory of multilayer adsorption and its adsorption isotherm. (6)

(b) Discuss any six applications of colloids. (9)

33. Solve the Schrodinger equation for a particle in one dimensional box.

34. (a) The force constant of CO is 1840 Nm^{-1}. Calculate the vibrational frequency in cm^{-1} and the spacing between the vibrational energy levels in eV. Compare this spacing with the thermal energy at 25°C. Atomic masses are $^{12}C = 19.9 \times 10^{-27}$ Kg; $^{16}O = 26.6 \times 10^{-27}$ Kg; 1 eV = 8066 cm^{-1}. (8)

(b) Compare IR spectra and Raman spectra. (7)

35. (a) Explain Gouy method of measurement of magnetic susceptibilty. (8)

(b) Explain the shielding and deshielding mechanism in NMR. (7)

(2 × 15 = 30 Marks)
