



K17U 0333

Reg. No. : .....

Name : .....

**VI Semester B.Sc. Degree (CBCSS – Regular) Examination, May 2017  
CORE COURSE IN CHEMISTRY  
(2014 Admn.)**

**6B16 CHE : Physical Methods in Chemistry**

Time : 3 Hours

Max. Marks : 40

**SECTION – A**

Answer **all** the 4 questions, **each** carries 1 mark.

1. Identify the point group of  $\text{NH}_3$  and  $\text{HCN}$ .
2. A linear N atomic molecule can have \_\_\_\_\_ number of fundamental vibrations.
3. The molecular formula of carbon cage structure containing twenty hexagons and twelve pentagons is
4. The NMR active isotope of Carbon is

**SECTION – B**

Short answer type, **each** carries 2 marks, answer **any 7** questions.

5. What is Born-Oppenheimer approximation ?
6. What are nanomaterials ? Give example for a 2-D nanomaterials.
7. Why IR spectroscopy is known as a fingerprinting technique ?
8. What is Raman scattering ?
9. State and explain the rule of mutual exclusion with an example.
10. What is the origin of molecular ion peak ?

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11. Give four applications of carbon nanotubes.
12. Differentiate between auxochrome and chromophore.
13. Explain different symmetry elements.
14. How AAS is used in inorganic analysis ?

SECTION – C

Short essay/problem type, **each** carries **3** marks, answer **any 4** questions.

15. What is meant by half wave potential ? What is its importance in polarography ?
16. Why TMS is used as an internal standard in NMR ? Explain the  $\tau$  and  $\delta$  scale.
17. Calculate the  $\lambda_{\text{max}}$  of butadiene and 2, 4-dimethylpenta-1, 3-diene by using Woodward Fieser Rule.
18. Explain the construction and working of dropping mercury electrode.
19. How will you identify inter and intra-molecular hydrogen bonding IR spectroscopy ?
20. What are the factors effecting chemical shift in MNR spectroscopy ?

SECTION – D

Long essay type, **each** carries **5** marks, answer **any 2** questions.

21. Discuss the microemulsion, precipitation and sol-gel method for the synthesis of nanoparticles.
22. Explain amperometric titration using the typical titration curves.
23. Write an essay on rotational-vibrational spectra of diatomic molecules.
24. a) State and explain Beer-Lambert's law. What are the possible electronic transitions in molecules ? 3  
b) A substance when dissolved in water at  $10^{-3}$  M concentration absorbs 10 per cent of the incident radiation in a path length of 1 cm. What would be the concentration of the solution in order to absorb 90 per cent of the same radiation ? 2