



TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Delhi Road, Moradabad (U.P.)

SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN CHEMISTRY

Max. Marks: 100

Time: 2.00 Hrs

Note:

1. The question paper is divided into two parts viz. Part-A and Part-B, carrying 50 marks each.
2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

- Q1. Who said that members of the same species are not alike?
- (a) Darwin
 - (b) Herbert Spencer
 - (c) Best
 - (d) Good
- Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
- (a) Sample parameter
 - (b) Inference
 - (c) Statistic
 - (d) None of these
- Q3. Generalized conclusion on the basis of a sample is technically known as
- (a) Statistical inference of external validity of the research
 - (b) Data analysis and interpretation
 - (c) Parameter inference
 - (d) All of the above
- Q4. A researcher selects a probability sample of 100 out of the total population. It is
- (a) A cluster sample
 - (b) A random sample
 - (c) A stratified sample
 - (d) A systematic sample
- Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
 - (b) stratified random sampling
 - (c) representative sampling
 - (d) none of these

Part (B)
Total Marks: 5 X 10 = 50

Q1. Derive the following equation a diatomic molecule:

$$q_{\text{rot}} = \frac{8\pi^2 I k T}{\sigma h^2}$$

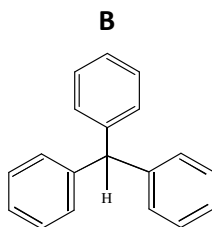
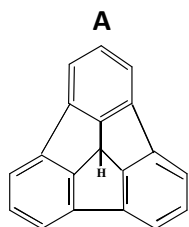
Q2. Draw and discuss the phase diagram for a three-component system consisting of acetic acid-benzene-water.

Q3. Explain the terms 'eigen value' and 'eigen function'.

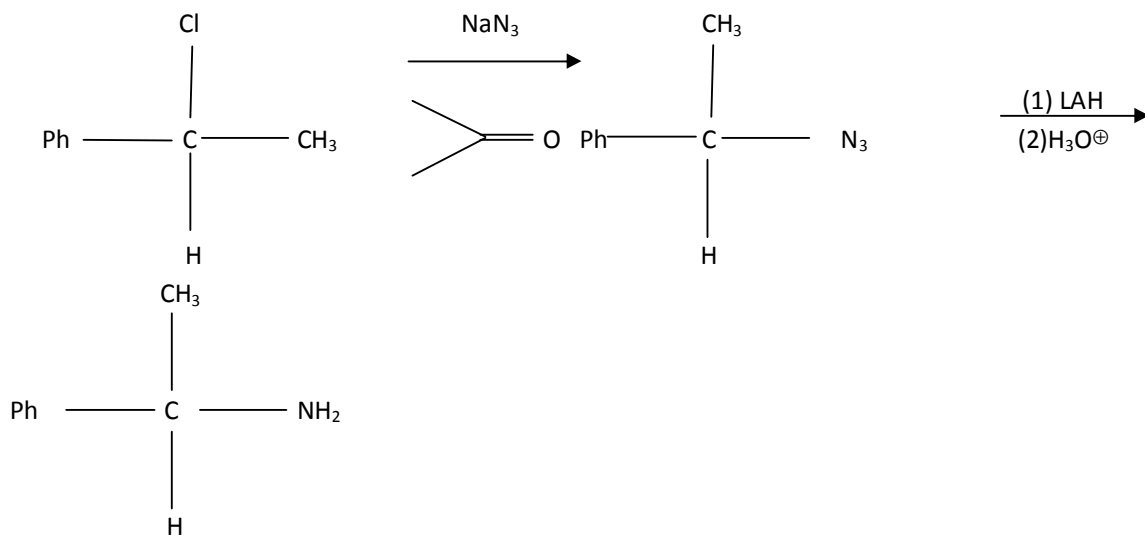
Q4. Show that

$$[L_x, L_y] = i\hbar L_z$$

Q5. Which of the compounds (A or B) would you expect to be the stronger acid? Give reasons.

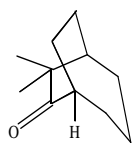


Q6. Briefly account for the stereochemistry of the following reaction sequence.

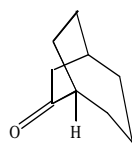


Q7. Which compound in each of the following pairs would be more extensively enolized? Give suitable reasons also.

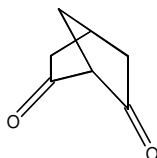
(a)



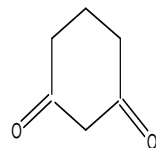
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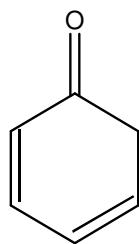
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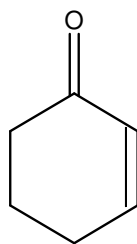
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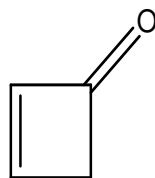
(c)



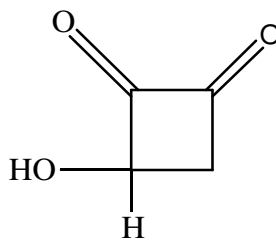
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(d)



and



Q8. From each of the following sets select the most reactive and least reactive substrates towards ring nitration.

- Benzene, toluene, nitrobenzene and bromobenzene.
- Benzene, aniline, acetophenone and acetanilide
- m-Dinitrobenzene, m-nitrotoluene and toluene.
- Benzene, mesitylene, m-xylene, p-xylene and toluene.
- Chlorobenzene, 2,4-dinitrochlorobenzene, and p-nitrochlorobenzene.

Caution: Please note that the questions appearing above in this sample paper are only for the guidance of the candidates.