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Code No. 6352

FACULTY OF SCIENCE

M.Sc. III – Semester Examination, December 2016

Subject: Chemistry (Organic Chemistry)

Paper – IV
Spectroscopy and Photochemistry

Time: 3 Hours **Max.Marks: 80**

Note: Answer all questions from Part-A and Part-B.
Each question carries 8 marks in Part-A and 12 marks in Part-B.

PART – A (4x8 = 32 Marks)
[Short Answer Type]

1 a) Describe the heteronuclear $J^{13}C - H$ coupling in ^{13}C NMR spectroscopy.

b) Write the principle and applications of INEPT experiment.

2 a) Define hetero COSY ($^{1}H - ^{13}C$ COSY) and explain with an example.

b) Discuss about the hyperfine splitting of ESR spectroscopy.

3 a) Explain photochemical electrocyclization with an example.

b) What is photo Fries rearrangement reaction, explain with suitable example.

4 a) Write short notes on Barton reaction.

b) Explain Norrish type-I reaction in cyclic ketones.

PART – B (4x12 = 48 Marks)
[Essay Answer Type]

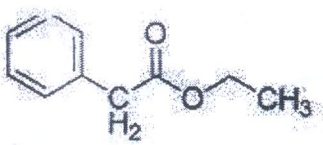
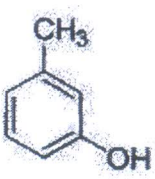
5 a) Write the application of ^{13}C NMR spectroscopy in reaction mechanism and stereochemistry.

b) Explain the calculation of ^{13}C chemical shifts of alkanes and alkenes giving any two examples.

OR

c) Write the principle and applications of APT and DEPT methods.

d) Predict the number of signals and appropriate δ (ppm) values in ^{13}C NMR of the following compounds.

(i) CH_3-CH_2-CH(OH)-CH_3 (ii)  (iii) 

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6 a) Draw the ESR spectra of following free radicals.
   i) Methyl
   ii) t-Butyl
   iii) Benzene
   iv) 1,4-Napthaquinone

   b) Write short notes on Homo COSY ($^1H - ^1H$ COSY) with an example.

OR

   c) Write the biological application of ESR spectroscopy.

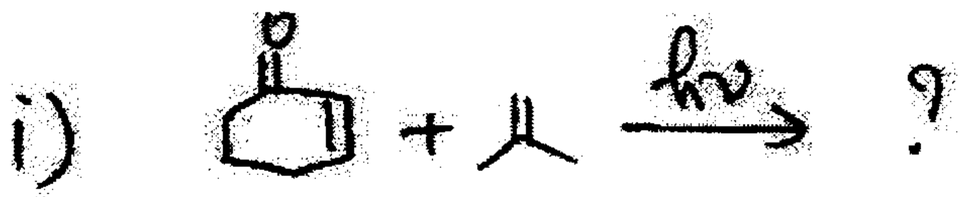
   d) Write short notes on TOCSY experiment.

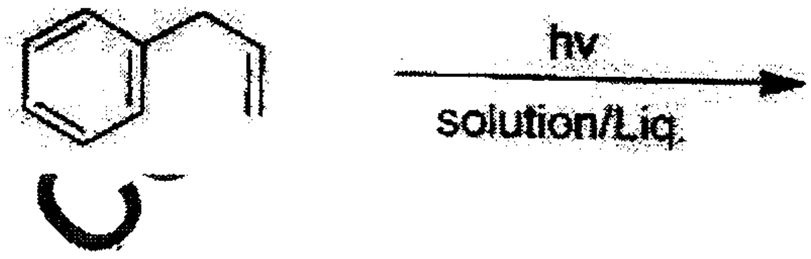
7 a) Briefly discuss about photodimersation of simple and conjugated olefins.

   b) Explain photo substitution reactions of aromatic compounds.

OR

   c) Write the products and explain with mechanism.

i) 

(ii) 

   d) Explain photochemical cis-trans isomerisation with suitable examples.

8 a) Explain Paterno-Büchi and Ene reactions with suitable examples.

   b) Explain chemiluminesent and oxidative coupling reactions.

OR

   c) Explain Norrish type-II reaction in ketones and 1,2-diketones.

   d) Write the photo chemistry of azo and diazo compounds.

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