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End Semester Examination of Semester–III, 2015
Subject : CHEMISTRY (PG)
Paper : CEM–301 (Org. Spl) (Th)
Full Marks : 40
Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

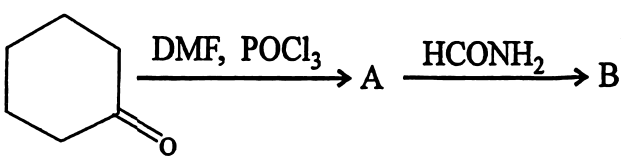
Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Answer one question from each unit

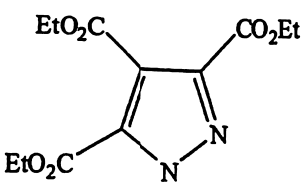
Unit–1

Answer **any one** question : 10x1=10

1. a) 

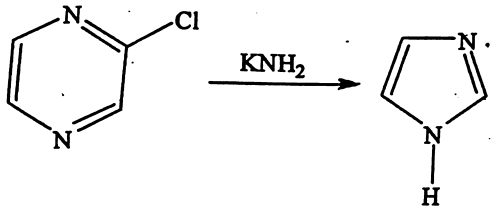
Identify A and B. Give mechanism. $2\frac{1}{2}$

b) How would you synthesize the following compound:



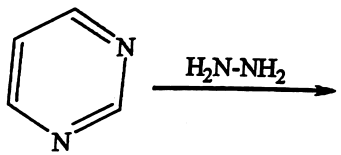
$2\frac{1}{2}$

c) Explain the following transformation: $2\frac{1}{2}$



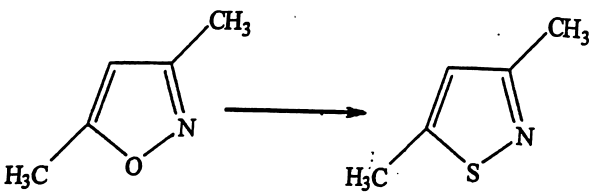
d) Outline the synthesis of Pyridoxine. $2\frac{1}{2}$

2. a) Predict the product(s) with proper explanation. $2\frac{1}{2}$

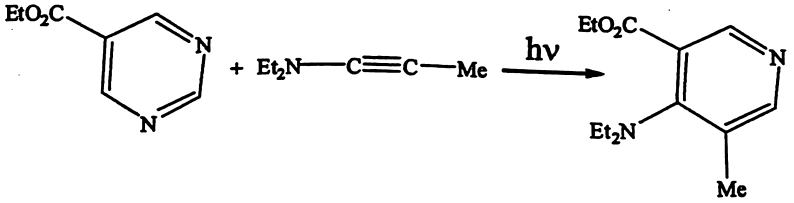


b) Compare the basicity of Pyridazaine, Pyrimidine and Pyrazine. $2\frac{1}{2}$

c) Convert : $2\frac{1}{2}$



d) Explain the formation of the product $2\frac{1}{2}$



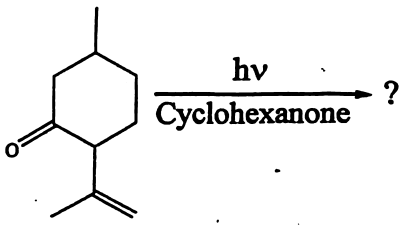
Unit II

Answer **any one** question : 10x1=10

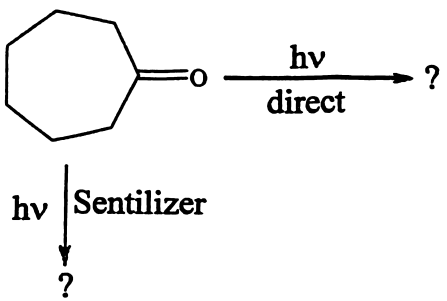
3. a) Show various transitions between excited and ground states of organic molecules in a Jablonski diagram (Show the diagram only). 2

b) Predict the product(s) of the following reactions with mechanism (attempt any four) 4x2=8

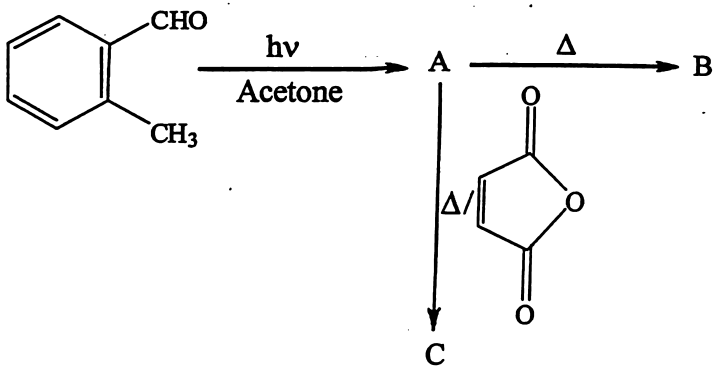
i)



ii)

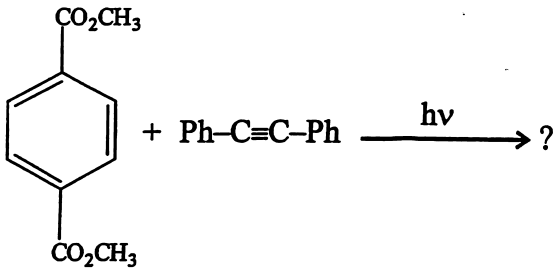


iii)



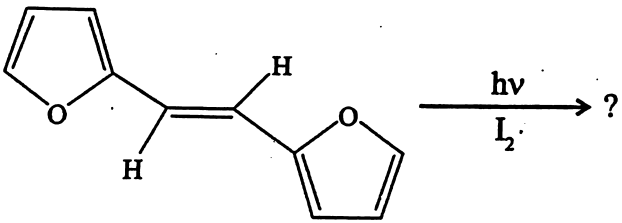
Identify the products A, B, C. 2X4

iv)

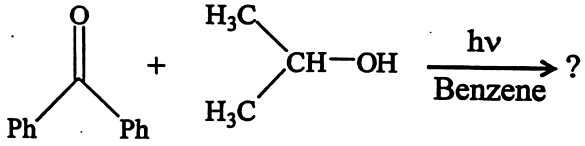


v) $CH_3COCH_2CO_2Et \xrightarrow[h\nu]{CH_3OH/} ?$

vi)



4. a)

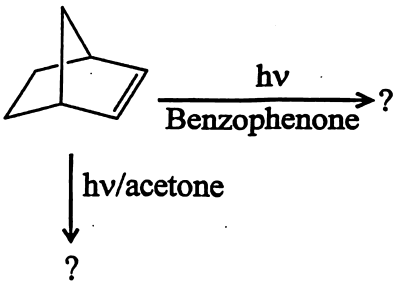


Quantum yield (ϕ) for the above reactions was observed "1". Explain the meachism of the reaction and established this observation. 3

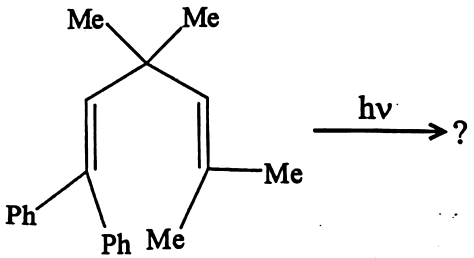
b) What is Paterno-Buchi addition reaction? 1

c) Predict the product(s) of the following reaction with mechanism (attempt any three).. 3x2=6

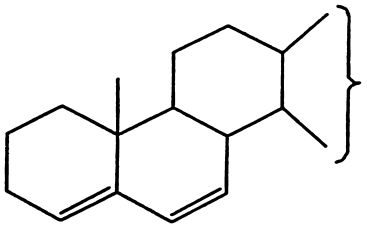
i)



ii)

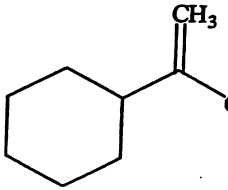


iii)



$\xrightarrow{h\nu}$?

iv)



$\xrightarrow[\text{Pentane}]{h\nu}$?

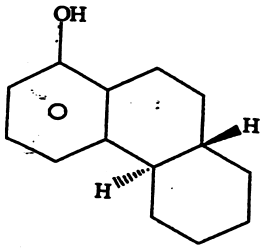
v) Furan + Benzophenone $\xrightarrow[\text{Benzene}]{h\nu}$?

Unit III

Answer **any one** question : 10X1=10

5. a) Compare and contrast cis-decalin and cis-1,2-dimethyl-cyclo-hexane in respect of (i) symmetry and chirality, and (ii) relative stability of conformers. 5

b) Identify the compounds A—E in the following transformations and explain your answer. 5



$\xrightarrow[\text{AcOH}]{H_2/Pt}$ + ($k_2 > k_1$)

A $\xrightarrow[k_1]{CrO_3}$ C $\xrightarrow{\text{Base}}$ No change

B $\xrightarrow[k_2]{CrO_3}$ D $\xrightarrow{\text{Base}}$ E (epimer of D)

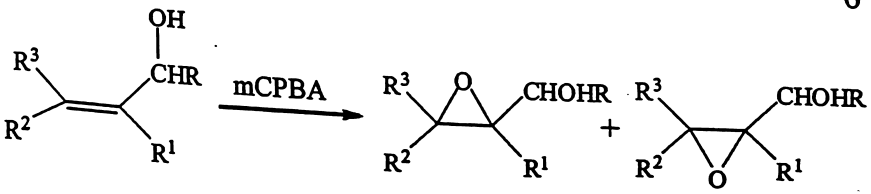
6. a) Comment on the Chivality, relative stability and sign of torsion angles of ring junction in the Central ring of (i) cis-c-cis and (ii) trans-t-trans isomers of perhydroantracene. 5

b) Write down the comformers of both the enantiomers of cis-1-decalone and trans-1-decalone. Designate the stereocentres with R/S notation. Label the conformers of cis-decalone as stereoidal or non-stereoidal. 5

Unit IV

Answer **any one** question : 10x1=10

7. a) Explain how the relative bulk of the substituents at the olefinic carbons control the diastereo selectivity of the following epoxidation reactions. 6



b) Calculate ΔG at 25^0C for cis-4-methylcyclohexanol from the given acetylation rates.4

Cyclohexanol : 3·76 units

cis-4-terbutylcyclohexanol : 2·89 units

trans-4-tert-butyl cyclohexanol : 10·65 units

8. a) cis-1-Benzoyl-2-phenyl cyclohexane furnishes a mono-bromonation product when treated with Br_2/AcOH. The corresponding trans-isomer fails to react. Explain with reason(s).

What happens when trans-1-acetyl-2-phenylcyclo hexane is so treated? 5

b) What is Curtin-Hammett Principle? Deduce it from the first principle mentioning the conditions under which it is valid. 5