

1(CCM-M)4

CHEMISTRY - II

[05]

Time Allowed -3 Hours

Maximum Marks-300

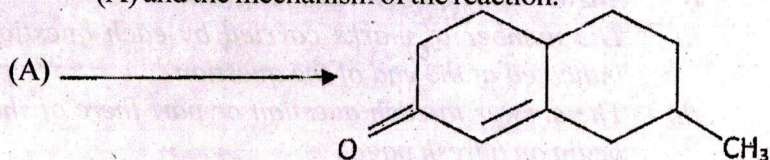
INSTRUCTIONS

- i) *Answer must be written in English.*
- ii) *The number of marks carried by each question is indicated at the end of the question.*
- iii) *The answer to each question or part there of should begin on a fresh page.*
- iv) *Your answer should be precise and coherent*
- v) *The part/parts of the same question must be answered together and should not be interposed between answers to other questions.*
- vi) ***Candidates should attempt any Five questions***
- vii) *If you encounter any typographical error, please read it as it appears in the textbook.*
- viii) *Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the answer script for strict adherence.*
- ix) *No continuation sheets shall be provided to any candidate under any circumstances.*
- x) *Candidates shall put a cross(X) on blank pages of answer script.*
- xi) *No blank page be left in between answer to various questions.*
- xii) *No programmable Calculator is allowed.*
- xiii) *No stencil(With different markings) is allowed.*

1. [20 marks x 3]

a) When salicylaldehyde is treated with ethanoic anhydride in presence of strong base, what product is formed? Give the mechanism of the conversion.

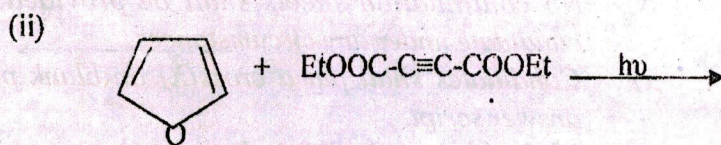
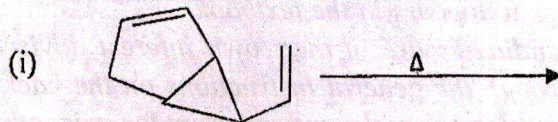
b) How would you synthesise the following compound using aldol condensation? Give the structure of starting material (A) and the mechanism of the reaction.



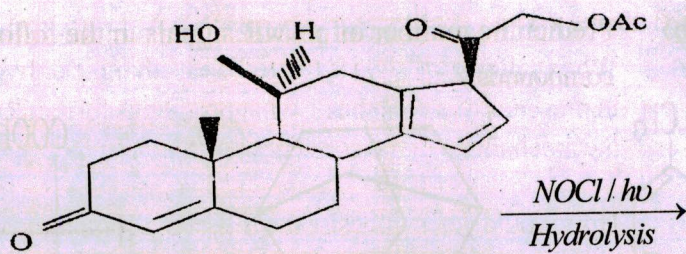
c) Acetaldehyde is treated with excess of formaldehyde in presence of $\text{Ba}(\text{OH})_2$ to give a solid organic compound. Give the name and the structure of solid organic compound?

2. [20 marks x 3]

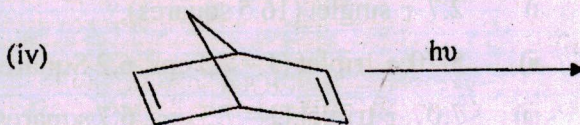
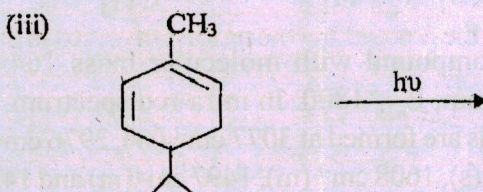
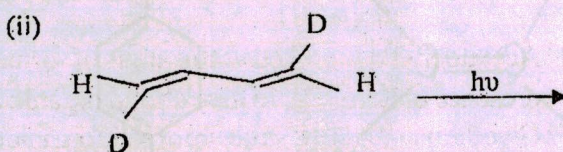
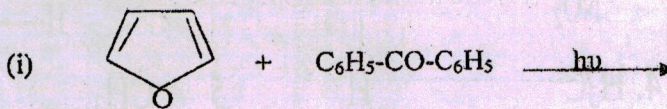
a) Give the product and the process involved in the following reactions



b) Complete the following reaction and explain the mechanism.

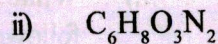
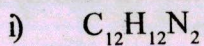


c) Complete the following reactions:

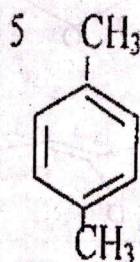
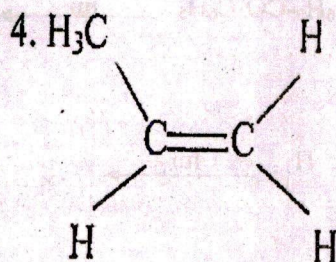
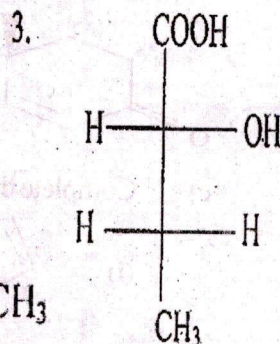
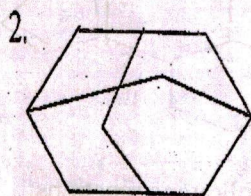
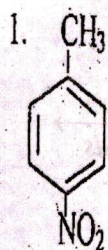


3. [10 marks+20marks+30 marks = 60 marks]

a) Calculate the degree of unsaturation in the compounds with molecular formula:



b) Predict the number of pNMR signals in the following compounds:



c) A compound with molecular mass 164 absorbs at 220 nm, E_{\max} 1800. In infra-red spectrum, absorption bands are formed at 3077 cm^{-1} (w), 2976 cm^{-1} (w), 1745 cm^{-1} (s), 1608 cm^{-1} (m), 1497 cm^{-1} (m) and 1456 cm^{-1} (m).

In NMR, the signals formed are

i) $2.7\ \tau$ singlet (16.5 squares),

ii) $5.70\ \tau$ triplet ($J = 7.3$ cps, 6.2 Squares)

iii) $7.07\ \tau$ triplet ($J = 7.3$ cps, 6.7 squares) and

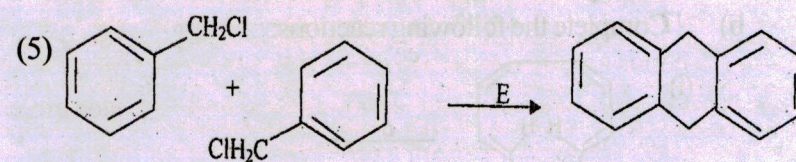
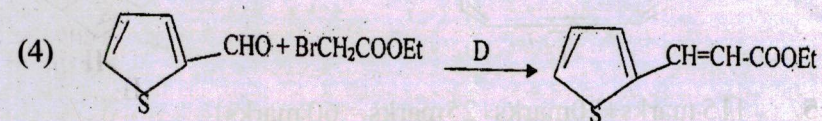
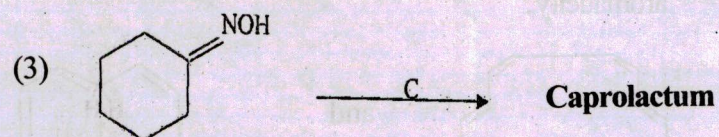
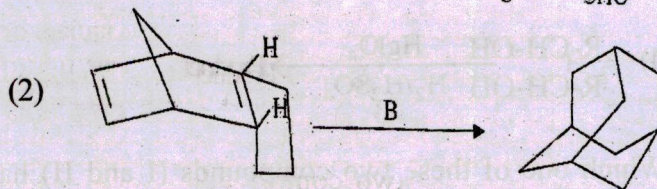
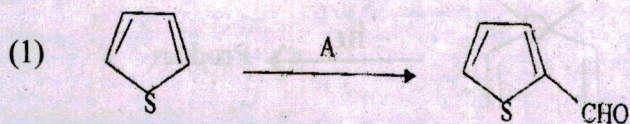
iv) $7.98\ \tau$ singlet (10.2 squares). Determine the structure of the compound.

4. [30marks+20marks+10marks = 60marks]

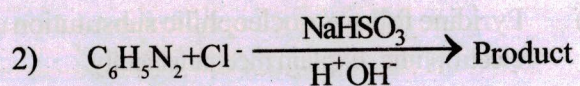
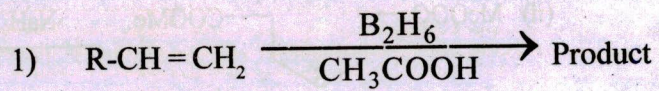
a) What are the reagents (A,B,C,D and E) used for the following conversion :

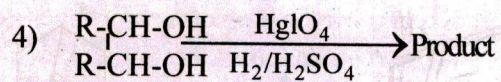
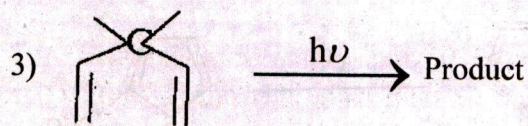
05-II

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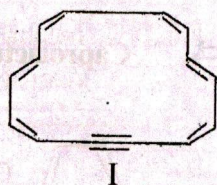


b) Write down the products of the following reactions:

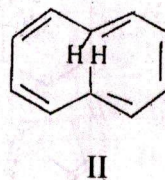




- c) Which one of these two compounds (I and II) has aromaticity?

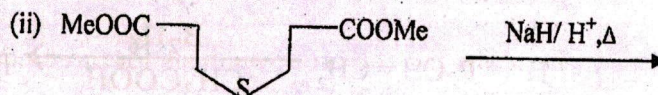
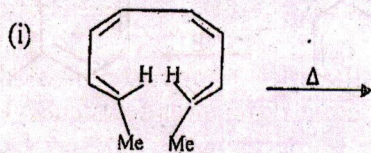


and



5. [15 marks+20marks+25marks = 60 marks]

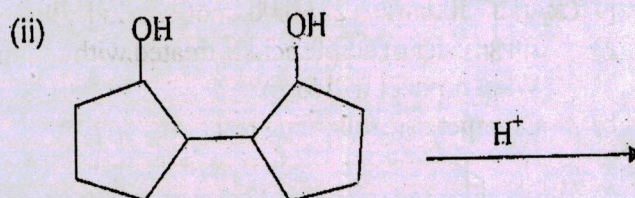
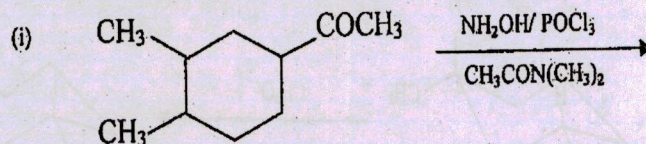
- a) Ethyl ester of adipic acid is treated with sodium ethoxide. What product will form?
b) Complete the following reactions:



- c) Pyridine follows nucleophilic substitution easily but not electrophilic. Explain mechanistically.

6. [20 marks+10marks+30marks=60marks]

- a) i) Compare the intensities of the C=C stretching band in the IR and Raman spectra.
ii) Explain why in Raman spectra, the Stoke's lines are far more intense than the Antistoke's lines?
- b) Calculate the degree of unsaturation in the compounds with molecular formula:
i) $C_{12}H_{12}N_2$
ii) $C_6H_8O_3N_2$
- c) Complete the following reactions with mechanism:



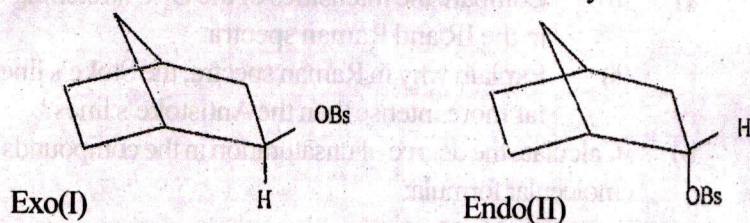
7. [10 marks+20marks+20marks+10 marks=60marks]

- a) What are the structural differences between Nylon-6,6 and Nylon-6?
- b) Dimethylterephthalate condenses with ethylene glycol in presence of weak base. What is the mechanism of condensation?
- c) Describe the end group analysis for the synthesis and characterization of polymer.
- d) What are the silicones? Give a brief account of their application in industry?

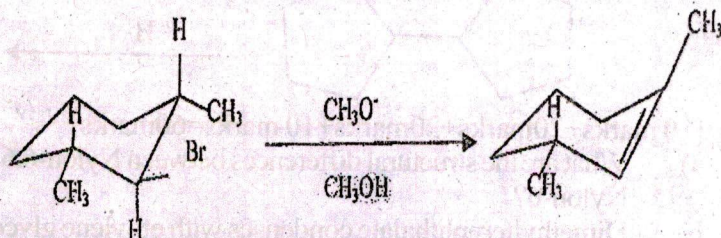
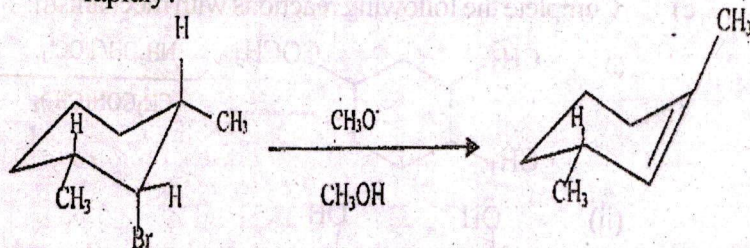
8. [10 marks+10marks+20marks+20marks=60marks]

- a) During the acetylation of exo-norbornyl
i) and endo-norbornyl

II) Bromylates, the solvolysis of exo-isomer is much faster than that of endo-isomer. Why?



b) Which reaction in the following pair will take place more rapidly?



c) 4-Chlorotoluene on treatment with NaNH_2 in liquid ammonia gives two products. What is the mechanism of the reaction?

d) Write brief notes on:

- i) Hammett's postulate.
- ii) Kinetically and thermodynamically controlled reactions.

