Q.P. Code : 09255

[Time : 2½ Hours] **[Marks : 60]**

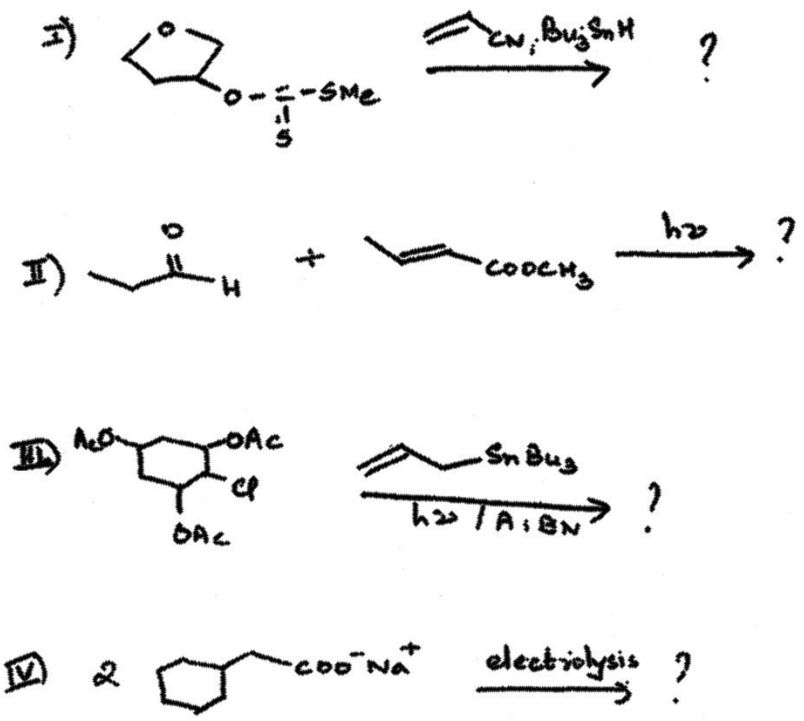
Please check whether you have got the right question paper.

N.B: 1. **All** questions carry **equal marks**.

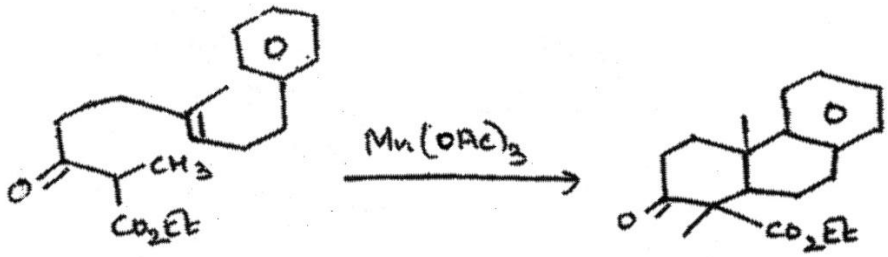
2. **Figures** to the **right** indicate **full marks**.

1. (a) Attempt **ANY TWO** of the following : **8**

i) Complete the following reactions :



ii) Give the mechanism of the following reaction :



iii) Discuss with examples the generation of radicals by C – S bond cleavage.

iv) Discuss with examples radical reactions on heteroaromatic compounds.

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(b) Attempt **ANY ONE** of the following : **4**

i) Give reasons for the following :

(I) AIBN is a good radical initiator.

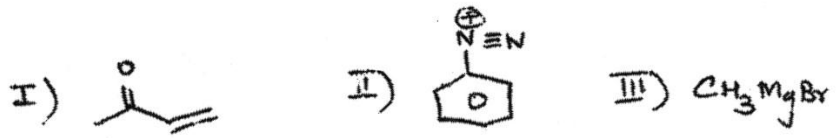
(II) The peroxyester $PhCH=CHCH_2\overset{O}{\overset{||}{C}}-O-O-C(CH_3)_3$ decomposes several times faster than the peroxyester $CH_3\overset{O}{\overset{||}{C}}-O-O-\overset{O}{\overset{||}{C}}-C(CH_3)_3$.

ii) Provide a mechanism to account for the products in the following reaction :

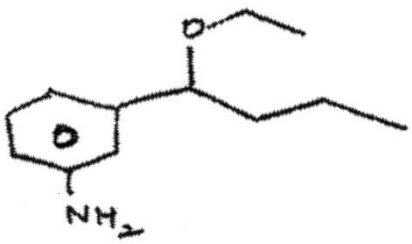
$$(CH_3)_3CH + CCl_4 \xrightarrow[\Delta]{\text{peroxide}} (CH_3)_3CHCl + CHCl_3.$$

2. (a) Attempt **ANY TWO** of the following : **8**

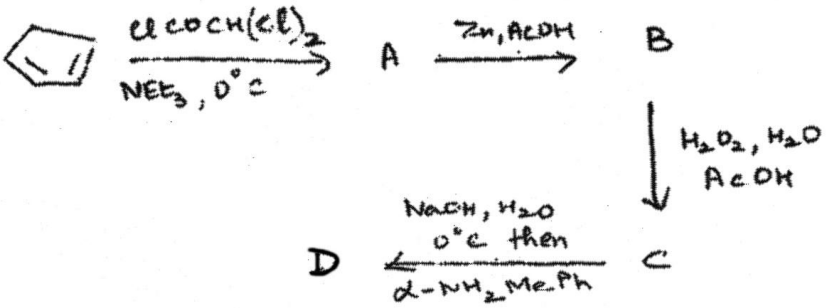
i) Explain the term synthon. Provide the synthons corresponding to the following synthetic equivalents :



ii) Provide a retrosynthesis of the following :



iii) Identify the intermediates A – D in the following synthetic sequence.



iv) Give the synthesis of camphoric acid from $EtOOCCH_2C(CH_3)_2CH_2COOEt$.

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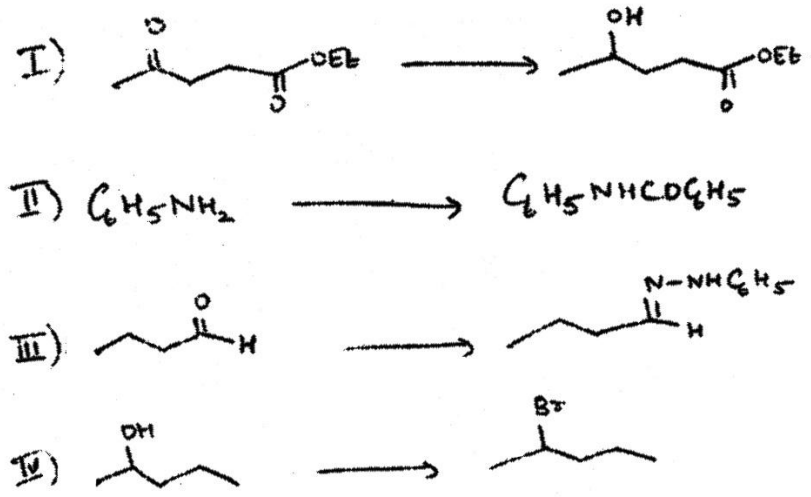
(b) Attempt **ANY ONE** of the following : **4**

i) Suggest reagents to bring about the following transformations :



ii) Discuss synthesis of six membered rings with suitable examples.

3. (a) Attempt **ANY TWO** of the following : **8**

i) What are cryptands? Give structure of $[2 \cdot 2 \cdot 2]$ cryptand. Illustrate applications of cryptand in organic synthesis.

ii) What are micelles? How are they formed? Explain their role as phase transfer catalyst in organic synthesis giving a suitable example.

iii) Discuss the advantages and selectivity of polymer supported reagents with examples.

iv) Give a brief account of zeolites as catalyst in organic synthesis.

(b) Attempt **ANY ONE** of the following : **4**

i) Discuss principle and selectivity of microwave assisted reactions.

ii) What are organic catalysts? Give their applications in organic synthesis.

4. (a) Attempt **ANY TWO** of the following : **8**

i) Give synthesis of methyl cinnamate using palladium catalyst. Discuss the mechanism of the reaction.

ii) Illustrate the applications of $Sc(OTf)_3$ as a water tolerant catalyst in the following reactions :

(I) Diels – Alder reaction

(II) Aldol condensation

(III) Michael reaction

(IV) Friedel Craft's reaction

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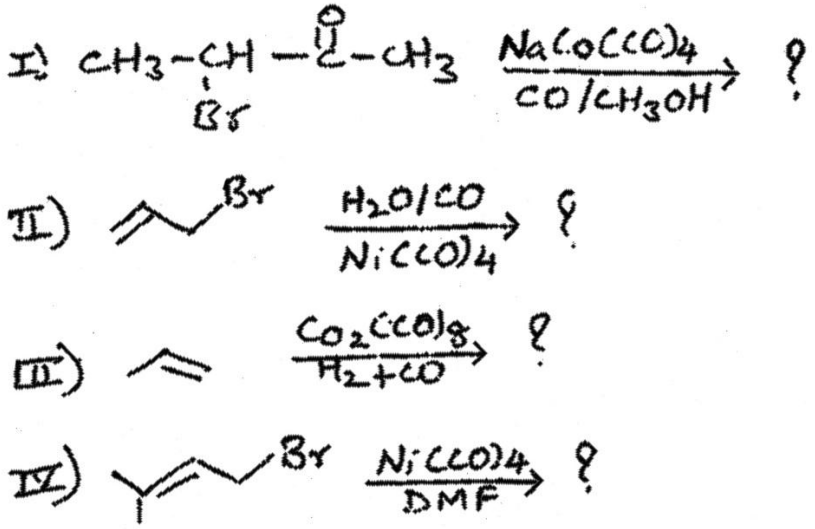
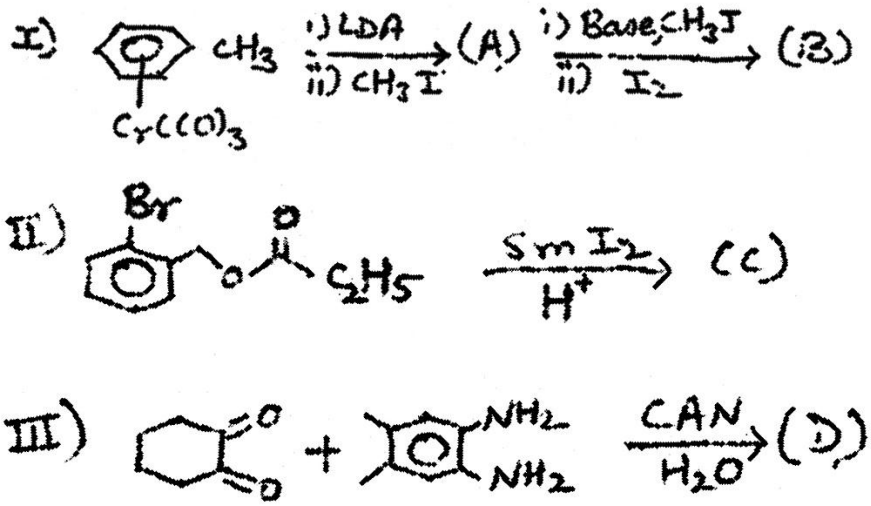
iii) Complete the following reactions : **4**



iv) Identify A, B, C and D in the following reactions :



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(b) Attempt **ANY ONE** of the following : **4**

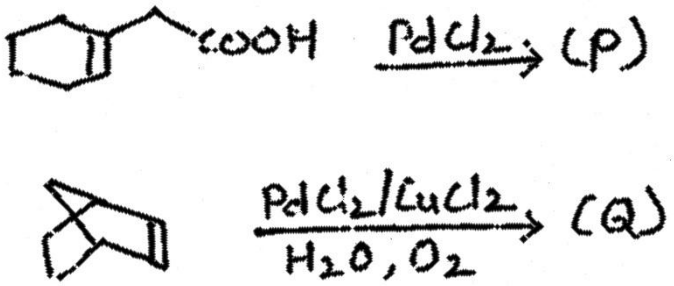
i) Explain the following terms with suitable examples :

(I) Oxidative addition

(II) Migratory insertion

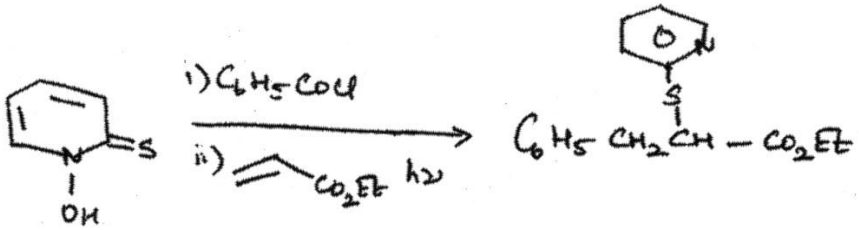
ii) (I) How is 5–chloro–1, 3–cyclo hexadiere prepared from 1, 3-cyclohexadiene using iron carbonyl.

(II) Complete the following reactions identifying P and Q.

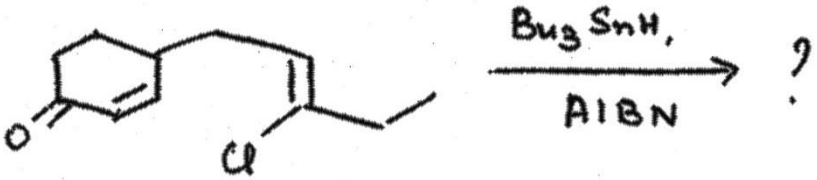


5. Attempt **ANY FOUR** of the following : **12**

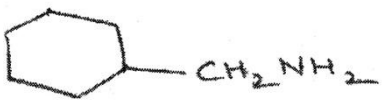
a) Provide a mechanism for the following reaction :



b) Give the product and mechanism for the following reaction :



c) Suggest retrosynthesis for the following compound :



d) Explain convergert and divergent synthesis.

e) Discuss the mechanism of the following reaction giving product :

$$CH_3(CH_2)_6CH_2Cl \xrightarrow[PTC]{NaCN\ /\ H_2O} ?$$

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f) What are clays? Explain their role in organic synthesis with suitable examples.

g) Explain the olefin metathesis of cyclopentene.

h) What is 18 electron rule? Applying this rule determine the value of *n* for $C_r(CO)_nC_6H_6$ (atomic number of Cr = 24).
