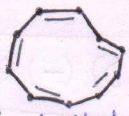
Model Answer

MID-SEMESTER EXAMINATION, WINTER: 2021-2022

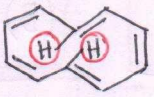
Subject: Chemistry (Common) (CYI 101) for B. Tech 1st year

Part B (22)

1 a) [10]-Annulene is non-aromatic, although bearing [4n+2] π-electrons - Explain. **2×5=10**



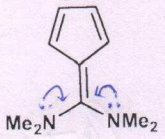
Cis-double bonds.
Internal <C-C-C = 144°; suffers from Serious angle strain ⇒ UNSTABLE, ~~but~~



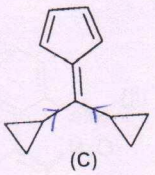
Suffers from strong steric crowding between the two peripheral H-atoms
⇓
NON-PLANNER str.

b) Arrange the following compounds in increasing order of dipole moment.

(A)



(B)



(C)

≡

Aromatic

Depending on the stabilizing effect of R (+I or +R)
↓
dipole moment vary.

Order: B > C > A

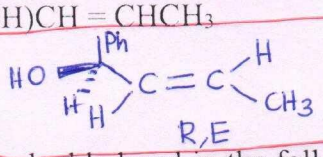
c) What is the percentage composition of a mixture of two enantiomers of 2-butanol whose rotation is +2.7°? The specific rotation of enantiomerically pure (+)-2-butanol is +13.5°.

% OPR ee = $\frac{\text{Sp. rotation of enantiomeric mixture}}{\text{Sp. rotation of pure enantiomer}} \times 100 = \frac{+2.7^\circ}{+13.5^\circ} \times 100 = 20\%$ w.r.t. (+) isomer.

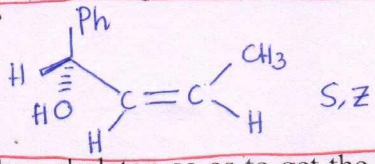
So, remaining 80% exists as racemic modification.

So, % composition of (+) isomer = 60%
" " " (−) isomer = 40%

d) Draw the possible configurations (R, E and S, Z) for the given compound:
Ph - CH(OH)CH = CHCH₃

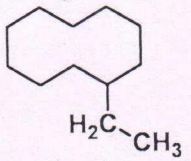


R,E

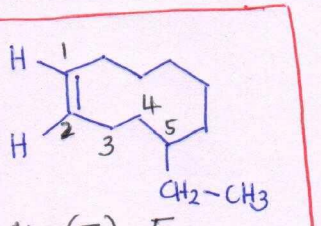


S,Z

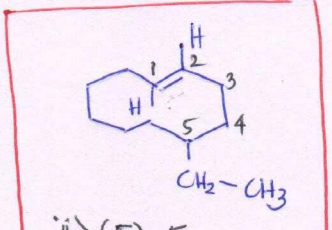
e) Introduce a double bond in the following carbon skeleton so as to get the structure of the following compounds:



i) (Z)-5-Ethylcyclodecene
ii) (E)-5-Ethylcyclodecene

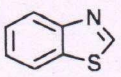


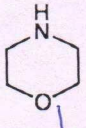
i) (Z)-5

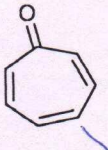


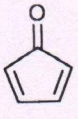
ii) (E)-5

2 a) Mention the following compounds as aromatic, non-aromatic, and antiaromatic. **3×4=12**

(i) 

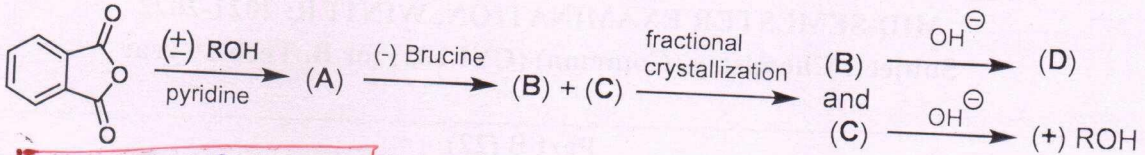
(ii) 

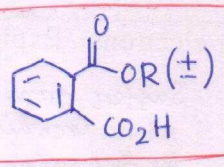
(iii) 

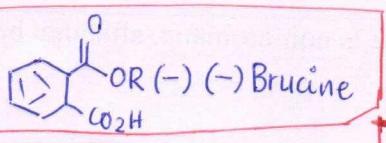
(iv) 

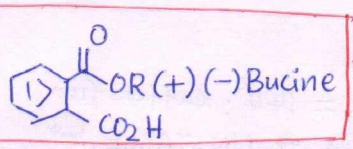
(i) Aromatic | (ii) Non-aromatic | (iii) Aromatic | (iv) Anti-aromatic

b) Identify (**A**) to (**D**)



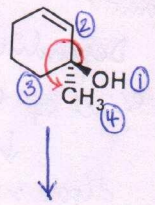
(A) 

(B) 

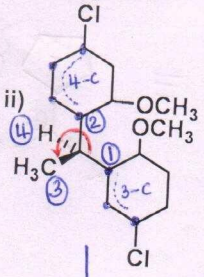
(C) 

(D) (−) ROH

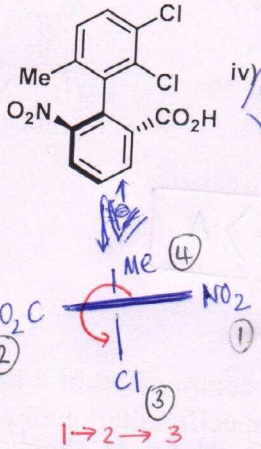
c) Identify the following compounds with R/S, R_a/S_a notations.

i) 

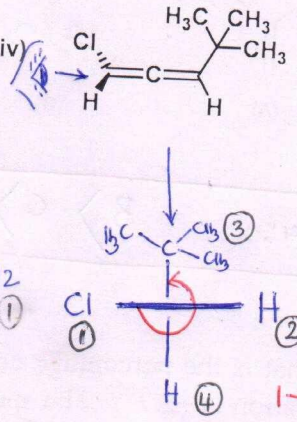
i) S

ii) 

ii) S

iii) 

iii) S_a

iv) 

iv) S_a