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End Semester Examination, December 2024

Program: B.Sc (H) Chemistry– III Semester

Heterocyclic Chemistry (SCCH306)

Time: 2.5 hrs.

Max Marks:50

Note: *All Questions are compulsory. Marks are indicated against each question.*

PART-A

Q.1 *Attempt any five*

- | | |
|--|----------------|
| (a) Why furan is least aromatic in comparison to pyrrole and thiophene? | [CO-4] [L-1] 2 |
| (b) Give the reason why benzofuran is more stable than furan towards acid? | [CO-4] [L-1] 2 |
| (c) Write short note on Paterno-Buchi reaction. | [CO-2] [L-6] 2 |
| (d) Discuss the ring opening reaction of oxetane in presence of Grignard reagent. | [CO-3] [L-6] 2 |
| (e) Why is the ring opening of oxetane by nucleophile slower than that of oxirane? | [CO-4] [L-1] 2 |
| (f) Oxirane has a higher dipole moment than thiirane. Explain. | [CO-1] [L-2] 2 |
| (g) Aziridine is less basic than ethylamine. Why? | [CO-1] [L-1] 2 |

2x5

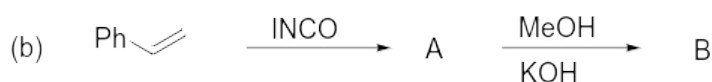
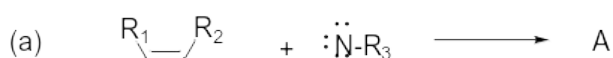
PART-B

Q.2 Explain the following reactions with mechanism [CO-1] [L-2] 10

- (a) Darzens Condensation
(b) The Gabriel ring closure

OR

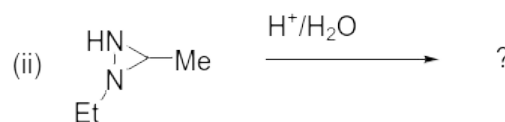
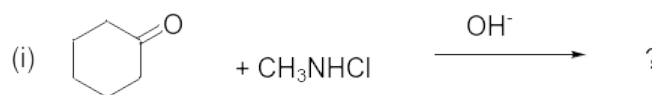
(i) Write product of the following reactions: [CO-1] [L-6] 5



(ii) (a) Suggest a method for the conversion of oxirane into thiirane. [CO-1] [L-6] 5

(b) Write the ring opening reaction of oxirane with organometallics.

Q.3 Predict the product and give suitable mechanism for each of the following reactions: [CO-2] [L-3] **10**



OR

- (i) Compare the basicity of an oxaziridine or diaziridine? [CO-2] [L-2] **10**
- (ii) Explain acid hydrolysis of an oxaziridine.
- (iii) Explain synthetic method of preparation of diaziridine from Schiff's base.

- Q.4 (i) Discuss the formation of product when 2-methylthietane are treated with acetyl chloride in presence of Lewis acid. [CO-4] [L-6] **10**
- (ii) Write and discuss the formation of major product when 2-phenyloxetane is treated with hydrochloric acid.

OR

- (i) Explain two synthetic methods for preparation of thietane. [CO- 3] [L-2] **10**
- (ii) Oxetane ring is cleaved only under vigorous conditions by nucleophiles. Explain.

- Q.5 (i) By drawing resonating structure, show that the electrophilic attack in thiophene preferred at the 2-position and not 3-position. [CO-4] [L-6] **10**
- (ii) Write all the steps of the Vilsmeier reaction for the formylation of pyrrole.

OR

- (i) Discuss two methods for the synthesis of imidazole. Why is it more basic than pyrazole?
- (ii) Write Fischer indole synthesis reaction with mechanism. [CO-4] [L-6] **10**

