

**Satavahana University**  
**Department of Chemistry**  
**Paper-II (Organic Chemistry)**  
**Ph.D. Course Work Syllabus – 2018**

**Paper Title: Organic Synthesis, Spectroscopy and Heterocyclics**

**Unit-I: Organic reagents and reactions**

**Unit-II: Asymmetric and retro synthesis**

**Unit-III: Spectroscopic applications of organic compounds**

**Unit-IV: 2D-NMR spectroscopy**

**Unit-V: Heterocyclics and biological evaluation**

**Unit –I: Organic reagents and reactions**

**12h**

Swern oxidation, DDQ, Cr-oxidants (Jones's reagent, PCC, PDC), Corey-kim oxidation, Reductions, electrophilic metal hydride reagents-LiAlH<sub>4</sub>, NaBH<sub>4</sub>, DIBAL, Dissolving metal reductions-Birch reduction.


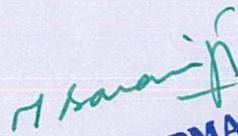
*Reactions:* Baylis-Hillmann reaction, Heck reaction, Suzuki coupling, sonogishira cross coupling, Julia-lythgoe olefination, Shapiro reaction, Mannich reaction and Wittig reaction.

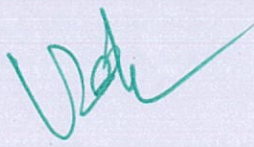

**Unit-II: Asymmetric and retro synthesis**

**12h**

*Asymmetric synthesis:* Topocity in molecules groups & faces, homotopic, heterotopic ligands and faces. Substrate selectivity, 1,2-asymmetric induction (Cram rule), chiral auxillary controlled method. Alkylation of chiral enolates, sharpless asymmetric amino hydroxylation, mukaiyama aldol reaction, Noyori-asymmetric hydrogenation.

*Retro synthesis:* introduction to retrosynthesis, target molecule, disconnection, synthon, selection of target molecule, chemoselectivity, regioselectivity, and stereoselectivity, reversal of polarity, one and two group C-C, C-X disconnections, applications of retrosynthesis to synthesis of Juvabione and longifolene.

  
  
**CHAIRMAN**  
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(Dr. K. SRINANI)

T. Murali  
(Dr. T. Bhavathi)



### Unit-III: Spectroscopic application of organic compounds

12h

**Differentiation of possible isomers:** i)  $C_9H_{10}O_2$ -Number of possible isomers and their detection by  $^1H$ -NMR spectra. ii) Hydroxycinnamic acid- Number of possible isomers and their detection.

**Differentiation pair of isomers:** Differentiation of isomers using different spectra: i) IR spectra: 3-Phenylpropanaldehyde-Propiophenone; 4-ethylaniline-4-methyl-N-methylaniline-N,N-dimethylaniline. ii) UV spectra: Propiophenone-phenylacetone; cis-stilbene - trans-stilbene. iii)  $^1H$ -NMR spectra: vinylacetate-methylacrylate; methylpropionate-ethylacetate. iv)  $^{13}C$ -NMR spectra: 1-pentene-2-pentene; vinylacetate-methylacrylate. v) Mass spectra: N,N-dimethylpropanamide-N-methylbutanamide; benzylacetate-ethylbenzoate; phenyl ethyl ketone-benzyl methyl ketone and pyrazol-imadzol; vi) All spectra: paracetamol-paramethoxybenzamide.

### Unit-IV: 2D-NMR spectroscopy

12h

Principle-Homo-2D-J-resolved and Hetero-2D-J-resolved spectroscopy, HOMO-COSY, TOCSY, Hetero-COSY, HMQC, HMBC, NOESY, and 2D-inadequate techniques by taking 1-iodo butane as example. Homo-COSY of dibutyl ketone, Hetero-COSY, HMQC, HMBC, and 2D-inadequate of Ipseanol, Homo-COSY and Hetero-COSY of menthol.

**Interpretation of the structure of natural products using spectral data (IR, UV, NMR and mass):** Camphor,  $\beta$ -Carotene, Menthol.

### Unit-V: Heterocyclics and biological evaluation

12h

**Heterocyclics:** Synthesis and chemical reactivity of the following heterocyclic molecules like, Isoxazoles, Thiazoles, Pyrimidines, and Benzimidazoles, Pyrazines, Quinoxoline, Quinazoline, Chromones and Flavones.

**Biological evaluation:** In vivo and In vitro studies. Cell line assay, Enzyme inhibition, Toxicity testing, cell viability assay, High through put screening. Explanation for  $IC_{50}$ ,  $EC_{50}$ ,  $EC_{90}$ ,  $LD_{50}$ ,  $ED_{50}$ ,  $K_i$ , MIC, Zone of inhibition studies. Ethical issues and regulatory affairs.

17/5/2017  
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